| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 261 | @ad<"20020124" and (remot$ adj1 tun$) | USPAT | OR | ON | 2005/03/07 11:31 |
| L2 | 108 | @ad<"20020124" and (remot$ adj1 tun$) and (cable) | USPAT | OR | ON | 2005/03/07 10:40 |
| L3 | 116 | @ad<"20020124" and (remot$ adj1 tun$) and (cable) | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:40 |
| L4 | 27 | @ad<"20020124" and (remot$ adj1 tun$) and (cable).ti,ab. | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:40 |
| L5 | 10 | @ad<"20020124" and ((remot$ adj1 tun$) same channel) and cable and customer and channel | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:51 |
| L6 | 2 | @ad<"20020124" and (remot$ adj1 tun$) and cable and customer and channel and (("ID" or identification or identity) near5 customer) | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:53 |
| L7 | 2 | @ad<"20020124" and (remot$ adj1 tun$) and cable and (("ID" or identification or identity) near5 customer) | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:54 |
| L8 | 116 | @ad<"20020124" and (remot$ adj1 tun$) and cable | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:55 |
| L9 | 43 | @ad<"20020124" and (remot$ adj1 tun$) and ((cable with (tv or television)) or ("catv")) | US-PGPUB; USPAT | OR | ON | 2005/03/07 10:56 |
| L10 | 48 | ("4008369").URPN. | USPAT | OR | ON | 2005/03/07 10:57 |
| L11 | 0 | @ad<"20020124" and (remot$ adj1 tun$) and 10 | USPAT | OR | ON | 2005/03/07 10:57 |
| L12 | 36 | ("4393277").URPN. | USPAT | OR | ON | 2005/03/07 11:03 |
| L13 | 31 | ("4393277").URPN. and remote | USPAT | OR | ON | 2005/03/07 11:03 |
| L14 | 26 | ("4393277").URPN. and remote and cable | USPAT | OR | ON | 2005/03/07 11:03 |
| L15 | 8 | ("4584684" \| "5245429" \| "5359367" \| "5374952" \| "5481296" \| "5488412" \| "5541662" \| "5557675").PN. | US-PGPUB; USPAT; USOCR | OR | ON | 2005/03/07 11:12 |
| L16 | 5 | ("4584684" \| "5245429" \| "5359367" \| "5374952" \| "5481296" \| "5488412" \| "5541662" \| "5557675").PN. and remote | US-PGPUB; USPAT; USOCR | OR | ON | 2005/03/07 11:12 |
| L17 | 4 | ("5655214").URPN. | USPAT | OR | ON | 2005/03/07 11:31 |
| L18 | 81 | @ad<"20020124" and Tivo | USPAT | OR | ON | 2005/03/07 11:32 |
| L19 | 0 | @ad<"20020124" and Tivo.ti,ab. | USPAT | OR | ON | 2005/03/07 11:31 |
| L20 | 46 | @ad<"20020124" and Tivo and (cable same (tv or television)) | USPAT | OR | ON | 2005/03/07 11:33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| L21 | 42 | @ad<"20020124" and Tivo$.as. | USPAT | OR | ON | 2005/03/07 11:34 |
| L22 | 11 | @ad<"20020124" and Tivo$.as. and (cable same (tv or television)) | USPAT | OR | ON | 2005/03/07 11:34 |
| L23 | 834 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)) and (cable same (tv or television)) | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:35 |
| L24 | 1 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)).ti. and (cable same (tv or television)).ti,ab. | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:36 |
| L25 | 36 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)).ti. and (cable same (tv or television)) | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:37 |
| L26 | 31 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)).ti. and (cable same (tv or television)) and remote | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:41 |
| L27 | 29 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)).ti. and (cable same (tv or television)) and remote and channel | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:46 |
| L28 | 13 | @ad<"20020124" and ("on-demand" or ("on" adj1 demand)).ti. and (cable same (tv or television)) and remote and ((select$ or designat$) near3 channel) | US-PGPUB; USPAT | OR | ON | 2005/03/07 11:46 |
| S1 | 647 | (CATV or (cable near1 (televison or TV)) and web).ti,ab. | USPAT | OR | ON | 2005/03/07 10:39 |
| S2 | 646 | (CATV or (cable near1 (televison or TV)) and (web near1 page)).ti,ab. | USPAT | OR | ON | 2004/02/11 10:28 |
| S3 | 280 | (CATV or (cable near1 (televison or TV)) and (web near1 page)).ti. | USPAT | OR | ON | 2004/02/11 10:28 |
| S4 | 280 | (CATV or (cable near1 (televison or TV)) and (web near1 page) and channel).ti. | USPAT | OR | ON | 2004/02/11 10:28 |
| S5 | 0 | ((CATV or (cable near1 (televison or TV))) and (web near1 page) and channel).ti. | USPAT | OR | ON | 2004/02/11 10:29 |
| S6 | 0 | ((CATV or (cable near1 (televison or TV))) and (web near1 page)).ti. | USPAT | OR | ON | 2004/02/11 10:29 |
| S7 | 2 | ((CATV or (cable near1 (televison or TV))) and web).ti,ab. | USPAT | OR | ON | 2004/02/11 14:19 |
| S8 | 3 | "6078961".URPN. | USPAT | OR | ON | 2004/02/11 10:30 |
| S9 | 57 | ((CATV or (cable near1 (televison or TV))) and tuner).ti,ab. | USPAT | OR | ON | 2004/02/11 14:19 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S10 | 7 | ((CATV or (cable near1 (televison or TV))) and tuner).ti. | USPAT | OR | ON | 2004/02/11 14:21 |
| S11 | 0 | ((CATV or (cable near1 (televison or TV))) and satillite).ti. | USPAT | OR | ON | 2004/02/11 14:21 |
| S12 | 5 | ((CATV or (cable near1 (televison or TV)))).ti. and (satellite with tuner) | USPAT | OR | ON | 2004/02/11 14:22 |
| S13 | 4945 | (CATV or (cable near1 (televison or TV)) and web) | USPAT | OR | ON | 2004/02/11 14:23 |
| S14 | 4587 | (CATV or (cable near1 (televison or TV)) and web and tuner) | USPAT | OR | ON | 2004/02/11 14:23 |
| S15 | 4531 | (CATV or (cable near1 (televison or TV)) and "web page" and tuner) | USPAT | OR | ON | 2004/02/11 14:24 |
| S16 | 88 | (CATV or (cable near1 (televison or TV))) and "web page" and tuner | USPAT | OR | ON | 2004/02/11 14:36 |
| S17 | 0 | (CATV or (cable near1 (televison or TV))) and "web page" and tuner and (bandwi$ with indicator) | USPAT | OR | ON | 2004/02/11 14:36 |
| S18 | 0 | (CATV or (cable near1 (televison or TV))) and tuner and (bandwi$ with indicator) | USPAT | OR | ON | 2004/02/11 14:37 |
| S19 | 9 | (CATV or (cable near1 (televison or TV))) and (bandwi$ with indicator) | USPAT | OR | ON | 2004/02/11 14:37 |
| S20 | 155 | (725/139).CCLS. | USPAT; USOCR | OR | OFF | 2004/02/11 15:03 |
| S21 | 1 | ("5715315").PN. | US-PGPUB; USPAT; USOCR | OR | OFF | 2004/02/11 16:58 |
| S22 | 0 | ("(setnear1topnear1box).ti.").PN. | USPAT; USOCR | OR | OFF | 2004/02/11 16:58 |
| S23 | 126 | (set near1 top near1 box).ti. | US-PGPUB; USPAT | OR | ON | 2004/02/11 16:59 |
| S24 | 51 | (set near1 top near1 box).ti. | USPAT | OR | ON | 2004/02/11 18:25 |
| S25 | 2 | (("6240441") or ("5812669")).PN. | US-PGPUB; USPAT; USOCR | OR | OFF | 2004/02/11 18:25 |

Considered @7 5/7/05

PARTIAL LISTINGS

US006148142A

# United States Patent [19]

Anderson

[11] Patent Number: 6,148,142

[45] Date of Patent: *Nov. 14, 2000

[54] **MULTI-USER, ON-DEMAND VIDEO SERVER SYSTEM INCLUDING INDEPENDENT, CONCURRENTLY OPERATING REMOTE DATA RETRIEVAL CONTROLLERS**

[75] Inventor: **Michael H. Anderson**, Moorpark, Calif.

[73] Assignee: **Intel Network Systems, Inc.**, Bedford, Mass.

[ * ] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/966,770**

[22] Filed: **Nov. 7, 1997**

**Related U.S. Application Data**

[63] Continuation of application No. 08/676,893, Jul. 8, 1996, abandoned, which is a continuation of application No. 08/214,859, Mar. 18, 1994, abandoned.

[51] **Int. Cl.**[7] ..... **H04N 5/76**; H04N 7/10

[52] **U.S. Cl.** ..... **386/125**; 386/126; 348/7; 348/12

[58] **Field of Search** ..... 348/7–8, 10, 12–13; 386/1, 4, 45–46, 52, 125–126, 69–70; 455/3.1, 3.2, 4.1, 4.2, 5.1, 6.1, 6.3; H04N 5/76, 5/92

[56] **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 4,506,387 | 3/1985 | Walter . | |
| 4,733,313 | 3/1988 | Izumita et al. . | |
| 4,870,643 | 9/1989 | Bultman et al. . | |
| 4,890,320 | 12/1989 | Monslow et al. . | |
| 4,920,432 | 4/1990 | Eggers et al. . | |
| 5,072,378 | 12/1991 | Manka . | |
| 5,130,792 | 7/1992 | Tindell et al. . | |
| 5,191,436 | 3/1993 | Yonemitsu | 358/335 |
| 5,191,584 | 3/1993 | Anderson . | |
| 5,218,672 | 6/1993 | Morgan et al. | 358/342 |
| 5,231,512 | 7/1993 | Ebihara et al. | 358/335 |
| 5,274,463 | 12/1993 | Matsumoto et al. | 358/335 |
| 5,414,455 | 5/1995 | Hooper et al. | 348/7 |
| 5,440,336 | 8/1995 | Buhro et al. | 348/7 |
| 5,768,625 | 6/1998 | Muramatsu et al. | 395/876 |
| 5,771,349 | 6/1998 | Picazo, Jr. et al. | 380/4 |
| 5,781,687 | 7/1998 | Parks | 386/52 |

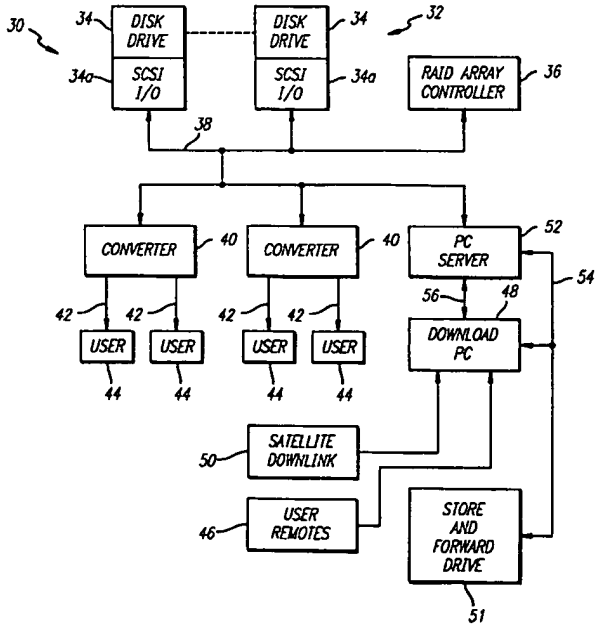
*Primary Examiner*—Thai Tran

*Attorney, Agent, or Firm*—Leah Sherry; Oppenheimer Wolff & Donnelly LLP

[57] **ABSTRACT**

A plurality of movies are distributively stored in digital form on a mass storage unit such as a Redundant Array of Inexpensive Drives (RAID) disk drive system such that they can be viewed on demand by multiple users. A master controller receives movie requests from users, and generates designation commands through a Small Computer System Interface (SCSI) bus that designates a retrieval controller at the requesting user's facility, and locations of the requested movie data in the RAID system. Successive designation commands are generated for successive blocks of the movie data. A designated retrieval controller reads a designated block of data from the RAID system through the SCSI bus, and converts the retrieved data into video picture and audio format to show the movie on a television receiver at the requesting user's facility. The movie data is preferably compressed on the RAID system in Motion Picture Experts Group (MPEG) format, and decompressed by the retrieval controllers.

**40 Claims, 5 Drawing Sheets**



US-PAT-NO: 6148142

DOCUMENT-IDENTIFIER: US 6148142 A

TITLE: Multi-user, **on-demand** video server system including independent, concurrently operating **remote** data retrieval controllers

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Application Filing Date - AD (1):
**19971107**

TITLE - TI (1):
Multi-user, **on-demand** video server system including independent, concurrently operating **remote** data retrieval controllers

Brief Summary Text - BSTX (3):
The present invention generally relates to the art of multi-user, on-demand video entertainment systems, and more specifically to a video server system including independent, concurrently operating **remote** data retrieval controllers for accessing video files from a central storage.

Brief Summary Text - BSTX (5):
User-on-demand, also known as pay-per-view, video entertainment systems are becoming increasingly popular in motel and hotel facilities as well as in larger scale community **cable television** (CATV) systems.

Brief Summary Text - BSTX (6):
Such a system includes a video server located at a central location that stores a plurality of movies that can be selected for viewing by one or more users at any desired time. The video server is connected to **television** receivers at the individual user locations by a **cable** or other network.

Brief Summary Text - BSTX (7):
Each user is provided with means for requesting that a selected movie be retrieved from the server and shown on his **television** receiver. In a small scale system such as installed in a motel or hotel, an interactive **remote** control unit can be provided for each **television** receiver by which the user can request a movie using a menu system displayed on the **television** screen. In a large scale system such as a community **cable television** network, the user can call the **cable** company by telephone to request that the movie fed to his home receiver.

Brief Summary Text - BSTX (11):
In the illustrated prior art configuration, all of the video and audio movie data and control functions are processed by a PC server 16, which is typically

a conventional personal computer (PC). A television receiver at the location of each user 18 is provided with an interactive **remote** control unit 20 by which the user can request a particular movie from a displayed menu on a pay-per-view basis. Movie requests from the **remote** control units 20 are sent to the PC server 16.

Brief Summary Text - BSTX (12):

In response to a movie request, the server 16 sends a command to the RAID array 12 to retrieve the data corresponding to the requested movie from the disk drives. The data is read out of the array 12 and fed back through the server 16 to a decoder array 36 which converts the data into an audio/visual **channel** and feeds it to the requesting user 18. In order to enable more than one user to view a movie simultaneously, data is retrieved from the array 12 in small time multiplexed blocks.

Detailed Description Text - DETX (3):

The system 30 further comprises a plurality of data retrieval controller units or converters 40 that are also connected to the data bus 38. Each converter 40 has at least one output that is connected through a video/audio **channel** 42 to a television receiver of a user 44. The user receivers can be provided in individual rooms of a motel or hotel facility, or in the homes of individual customers.

Detailed Description Text - DETX (6):

Each user 44 is provided with an interactive **remote** control unit for requesting a movie from a menu displayed on the user's television receiver. The **remote** control units are collectively designated as 46, and cause signals or commands designating requested movies to be sent to a download PC 48 which is typically embodied by a personal computer.

Detailed Description Text - DETX (13):

As will be described in detail below, each converter 40 includes a data buffer that can accommodate asynchronous transmission of data to and from the converter 40 at different rates. The converter 40 decodes or decompresses the MPEG encoded digital data to produce analog picture and sound data and sends it to the requesting user 44 via the **channel** 42. In this manner, 2 seconds of the requested movie are retrieved from the RAID array 32 and shown on the requesting user's television receiver.

Detailed Description Text - DETX (19):

The microprocessor 62 controls the controller 60 to cause the digital movie data that is addressed thereto by the array 32 to be converted from SCSI format into a format suitable for storage in the memory 68. The memory bus 70 comprises two Direct Memory Access (DMA) **channels** that enable data to be simultaneously written into and read out of the memory 68.

Detailed Description Text - DETX (20):

The 2 second block of data is read out of the buffer memory 68 under control of the microprocessor 62 and fed to a system decoder 72 for the requesting user

44 through the microprocessor bus 66. A single converter 40 can support more than one, here illustrated as two, video/audio **channels** 42 for respective users 44, with a separate decoder 72 provided for each user 44.

Detailed Description Text - DETX (21):
The system decoder 72 separates the video digital data from the audio digital data and feeds them to a video decoder 74 and an audio decoder 76 respectively along with requisite timing signals. Each **channel** 42 is constituted by analog audio and video outputs of the decoders 74 and 76 respectively.

Detailed Description Text - DETX (22):
The video decoder 74 is preferably embodied by a CL950 MPEC VIDEO DECODER that is available from C-Cube Microsystems of Milpitas, Calif. The decoder 74 decompresses the digital video data to produce analog video picture data in, preferably, RS-170A Analog Composite Video format. The decoder 76 decompresses the digital audio data to produce an analog audio signal in, preferably, the 48 KHz Analog Video standard. These signals are transmitted through the **channel** 42 and applied to show the 2 second block of the movie on the requesting user's television receiver.

Detailed Description Text - DETX (23):
The two DMA **channels** of the memory bus 70 enable the converter 60 to compensate for variable data rates that are inherent in data retrieval from the RAID array 32 and decompression of MPEG encoded data. Since a number of users 44 can be watching movies at the same time and the designation commands compete for transmission over the bus 38 under the SCSI protocol, data will be received by the converter 40 from the RAID array 32 and stored in the buffer memory 68 at a variable rate. This rate will be much higher than the rate at which data is read out of the buffer memory 68 and decompressed by the decoders 74 and 76.

Detailed Description Text - DETX (24):
The decoders 74 and 76 feed the analog output signals into the **channel** 42 at a fixed rate corresponding to a video frame rate of 30 frames/second. MPEG decompression is performed at a variable rate depending on the correlation between adjacent video frames. For this reason, data will be read out of the buffer memory 68 and applied to the decoder 72 at a variable rate. The buffer memory 68 is required to enable the data to be retrieved from the RAID array 32 and output to the decoder 72 at different rates.

Detailed Description Text - DETX (26):
The present invention enables a number of converters to supply video and audio movie signals to respective users 44 simultaneously, with the data transfers over the SCSI bus 38 being arbitrated by the SCSI protocol. In an exemplary application, 14 converters 40 can be connected to the RAID array 32, with 4 users being served by each converter 40 via a respective **channel** 42. Thus, a total of 56 users can be served by the system 30, as opposed to 16 users for the prior art system of FIG. 1.

Claims Text - CLTX (5):
a download computer converting data received in analog form into compressed digital format to be stored in the storage, as well as receiving from interactive **remote** control units and processing data request commands; and

Claims Text - CLTX (60):
a download computer capable of converting movie data received in analog form into compresses digital format to be stored in the mass storage unit as well as receiving from interactive **remote** control units and processing movie requests;

Claims Text - CLTX (65):
one or more of the interactive **remote** control units that are remotely linked to the download computer for sending thereto commands requesting selected movies from among the listed movies.

Claims Text - CLTX (73):
video/audio **channels** interfacing between the retrieval controllers and corresponding user receivers and delivering requested movies data from respective designated retrieval controllers to the corresponding user receivers, the data being produced by the respective designated retrieval controllers in a predetermined format.

Claims Text - CLTX (87):
33. A system as in claim 22, in which the retrieval controllers are each capable of supporting more than one video/audio **channel** with a separate decoder for each video/audio **channel** to a corresponding user receiver.

Claims Text - CLTX (102):
sending the converted data from the retrieval controllers to respective user receivers via respective video/audio **channels**.

US006848116B1

(12) **United States Patent**
**Land**

(10) **Patent No.: US 6,848,116 B1**
(45) **Date of Patent: Jan. 25, 2005**

(54) **METHOD AND APPARATUS FOR ON-DEMAND VIDEO PROGRAM ACCESS CONTROL USING INTEGRATED OUT-OF-BAND SIGNALING FOR CHANNEL SELECTION**

(75) Inventor: **Thomas Land**, Ashburn, VA (US)

(73) Assignee: **ITT Manufacturing Enterprises, Inc.**, Wilmington, DE (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/481,554**

(22) Filed: **Jan. 11, 2000**

**Related U.S. Application Data**

(60) Provisional application No. 60/115,765, filed on Jan. 13, 1999.

(51) **Int. Cl.**[7] ..... **H04N 7/173**

(52) **U.S. Cl.** ..... **725/78**; 725/82; 725/106; 725/121; 725/126; 725/128

(58) **Field of Search** ..... 725/4, 78, 82, 725/49, 68, 106, 108, 111, 109, 105, 121, 120, 128, 126

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 5,130,664 | A * | 7/1992 | Pavlic et al. | 330/55 |
| 5,483,277 | A * | 1/1996 | Granger | 725/120 |
| 5,488,413 | A * | 1/1996 | Elder et al. | 725/106 |
| 5,610,916 | A * | 3/1997 | Kostreski et al. | 370/487 |
| 5,613,190 | A * | 3/1997 | Hylton | 455/3.1 |
| 5,708,961 | A * | 1/1998 | Hylton et al. | 725/81 |
| 5,774,527 | A * | 6/1998 | Handelman et al. | 379/93.07 |
| 5,805,591 | A * | 9/1998 | Naboulsi et al. | 370/395.6 |
| 5,812,928 | A * | 9/1998 | Watson, Jr. et al. | 455/5.1 |
| 5,815,794 | A * | 9/1998 | Williams | 725/125 |
| 5,832,041 | A * | 11/1998 | Hulyalkar | 375/340 |
| 6,212,278 | B1 * | 4/2001 | Bacon et al. | 380/240 |
| 6,219,409 | B1 * | 4/2001 | Smith et al. | 379/106.09 |
| 6,266,816 | B1 * | 7/2001 | Watson, Jr. et al. | 725/120 |
| 6,282,189 | B1 * | 8/2001 | Eames | 370/352 |
| 6,286,142 | B1 * | 9/2001 | Ehreth | 725/78 |
| 6,307,862 | B1 * | 10/2001 | Silverman | 370/442 |
| 6,317,884 | B1 * | 11/2001 | Eames et al. | 709/217 |
| 6,321,381 | B1 * | 11/2001 | Yuen et al. | 725/28 |
| 6,321,384 | B1 * | 11/2001 | Eldering | 725/125 |
| 6,418,558 | B1 * | 7/2002 | Roberts et al. | 725/129 |
| 6,477,179 | B1 * | 11/2002 | Fujii et al. | 370/466 |
| 6,507,649 | B1 * | 1/2003 | Tovander | 379/230 |
| 6,574,794 | B1 * | 6/2003 | Sarraf | 725/63 |

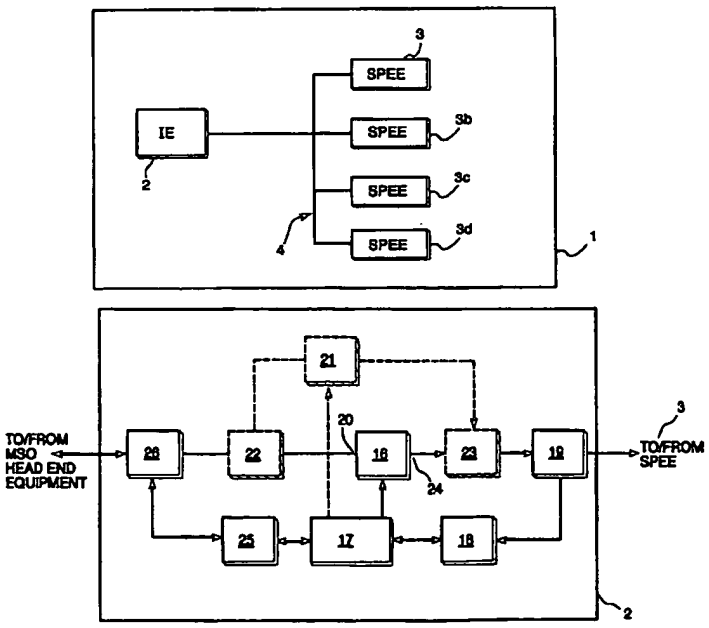
* cited by examiner

*Primary Examiner*—John Miller
*Assistant Examiner*—Annan Q. Shang
(74) *Attorney, Agent, or Firm*—Jim Zegeer

(57) **ABSTRACT**

An on-demand program access system for broadband, frequency division multiplexed cable television signals, one or more infrastructure element (IF) constituting a local video network signal server has a plurality of subscriber premise equipment elements (SPEE) served thereby. Each SPEE constitutes a video network client. Coaxial premise wiring connects each SPEE with the IE for conducting RF modulated programming signals and bi-directional data signals between the IE and each respective SPEE using out-of-band signaling so that there is no overlap between the programming signals and the bi-directional data signals.

**5 Claims, 15 Drawing Sheets**



US-PAT-NO: 6848116

DOCUMENT-IDENTIFIER: US 6848116 B1

TITLE: Method and apparatus for **on-demand** video program access control using integrated out-of-band signaling for **channel selection**

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Abstract Text - ABTX (1):

An on-demand program access system for broadband, frequency division multiplexed **cable television** signals, one or more infrastructure element (IF) constituting a local video network signal server has a plurality of subscriber premise equipment elements (SPEE) served thereby. Each SPEE constitutes a video network client. Coaxial premise wiring connects each SPEE with the IE for conducting RF modulated programming signals and bi-directional data signals between the IE and each respective SPEE using out-of-band signaling so that there is no overlap between the programming signals and the bi-directional data signals.

Application Filing Date - AD (1):

**20000111**

TITLE - TI (1):

Method and apparatus for **on-demand** video program access control using integrated out-of-band signaling for **channel selection**

Parent Case Text - PCTX (2):

The present invention is based on provisional application Ser. No. 60/115,765 filed Jan. 13, 1999 entitled METHOD AND APPARATUS FOR ON DEMAND VIDEO PROGRAM ACCESS CONTROL USING INTEGRATED OUT-OF-BAND SIGNALING FOR **CHANNEL SELECTION**.

Brief Summary Text - BSTX (2):

The **cable television** industry broadcasts audio and video programming, and other services, into homes, businesses, and to other subscribers using a broadband, frequency division multiplexed signal over multiple media types, including RF, fiber optic, and coaxial **cable** media (FIG. 1). Typically, the last leg of the transmission is over coaxial **cable** into the subscriber premises and all programming services are available over this **cable**. Signals representing a multitude of programmed broadcasts are typically frequency division multiplexed within the 54 megahertz (MHz) to 860 megahertz frequency range. Moreover, in recent years, additional services have been proposed that further crowd the available spectrum below 1 gigahertz (GHz) that is typically achievable in much of the installed coaxial media. This includes proposals to

use signaling in the 8 MHz to 46 MHz range, and 70 to 130 MHz range for two-way data signaling (FIG. 2). Because frequency assignments in the various **cable television** frequency standards may not coincide with the tuning capability of a subscriber's **television** set, typical subscriber premise equipment includes a separate box (the "**cable** converter") which is used to map incoming channels to another channel (typically channel 3 or 4) for which the subscriber's **television** set is capable of receiving (FIG. 3A). Use of a **cable** converter may be precluded if the subscriber has **cable**-ready equipment on the premises that is compatible with the **cable** signal being provided by the **cable** operator (FIG. 3B). However, in some cases, another class of **cable** converter may be required even in these cases to address frequency incompatibilities and/or signal decryption requirements.

Brief Summary Text - BSTX (4):

The objects of this invention include reducing costs to the cable operator by reducing exposure to equipment losses by reducing (and, ultimately, eliminating) subscriber premises equipment (SPE) costs, and eliminating the requirement and cost associated with signal scrambling into the subscriber premises. The invention accomplishes this by providing on-demand cable programming using out-of-band signaling techniques to provide **channel selection** data from equipment located within the subscriber premises to signal-server equipment located outside the subscriber premises. Since, in the invention, a substantial majority of the SPE, formerly located within the subscriber premises, is moved outside the subscriber premises, there is increased equipment security, increased signal security, and the adjunct benefit of increased accessibility of equipment for servicing (thereby reducing loses due to rescheduled field service calls).

Drawing Description Text - DRTX (3):

FIG. 1 is an overview of a **cable TV** distribution system,

Drawing Description Text - DRTX (5):

FIG. 3A is an illustration of subscriber premises using **cable** converter for CATV access, FIG. 3B is an illustration of subscriber premise equipped with "**cable** ready" **television** equipment for CATV access, FIG. 3C is an illustration of subscriber premises equipped with a **cable** descrambler/decoder for access to subscription and pay-per-view (PPV) channels,

Drawing Description Text - DRTX (15):

FIG. 13 is a block diagram showing the **channel selector architecture for the external channel selector** relay 100 shown in FIG. 12.

Detailed Description Text - DETX (2):

The invention provides program access control for on-demand **cable television** programming, increased signal security, increased serviceability, and increased subscriber premise equipment security using the apparatus of FIG. 4. Although the preferred embodiment of the invention provides on-demand program access to broadband, frequency division multiplexed **cable television** signals, it can be readily understood by one skilled in the art that this same apparatus may be

applicable to other signal selection and distribution problems of similar nature.

Detailed Description Text - DETX (3):

**Cable television** operators, and other media service operators (MSO), provide **television** and other program access to multiple households, or service locations, typically serving a broad geographic region, using a variety of channel media including RF, fiber optic, and coaxial **cable** media (FIG. 1). The subject invention is divided into two major functional subsystems contained within a service location 1 and a method of communications between them. Two major functional subsystems are the Infrastructure Element (IE) 2, which functions as a local video-network signal-server, and the Subscriber Premises Equipment Element (SPEE) 3, which functions as a video-network client. In the preferred embodiment of the invention, the SPEE 3 and the IE 2 are connected through coaxial premise wiring 4. Such coaxial premise wiring 4 is common in households today. The premise wiring 4 conducts radio frequency modulated **television** signals, or other programming signals, between the IE 2 to the SPEE 3. The coaxial premise wiring 4 also conducts bi-directional data signals between the IE 2 and the SPEE 3 using out-of-band (OOB) signaling techniques (FIG. 5) so that there i no spectral overlap between the **television** signal and the data signal. In the preferred embodiment of the invention, the OOB signaling technique would be implemented using a local area networking (LAN) protocol.

Detailed Description Text - DETX (4):

In practice, the SPEE 3 would respond to user input, received via keypad or other **remote** signaling device RS, to request a particular channel of television or other programming from the IE 2 using OOB signaling to transmit a data message over the coaxial premise wiring 4. The IE 2, upon receipt of the program request, would confirm the request by frequency-translating the requested channel to a channel frequency that is agreeable to requesting SPEE 3 and which does not conflict with programming being received by other SPEE 3 within the same service location 1.

Detailed Description Text - DETX (6):

In the invention, the SPEE 3, shown in FIG. 8, is composed of four major subelements: A television receiver 5 capable of receiving (and, in some cases, decoding, processing, recording and/or displaying) conventional television signals at their standard RF channel assignments via its signal input terminal 6, a microcontroller 7, a Local Area Networking (LAN) controller (acting as an OOB signaling converter) 8, and a frequency diplexer 9. The diplexer 9 separates and routes signal frequency components present at its input terminal 10 into the separate frequency bands corresponding to the television band on one terminal 11 and the IE-SPEE OOB signaling at the other terminal 12. The diplexer 9 also acts to combine frequency separated signals at terminals 11 and 12 into a single signal at terminal 10. The LAN controller 8 supports bi-directional communication between the SPEE 3 and the IE 2. In addition to the four major sub-elements, the SPEE 3 contains three additional minor sub-elements relating to the user interface: A local, keypad user control input

13; a **remote** user control input 14; and a display unit 15 which would be used to display the user **channel selection**.

Detailed Description Text - DETX (7):

In operation, the user of the invention would identify his or her **channel selection** by either direct entry using the keypad user control input 13 or using the **remote** user control input 14. The user **channel selection** is received by the microcontroller 7, which requests the identified channel from the IE 2 through the LAN controller 8 by sending a data message from the SPEE 3 to the IE 2 through the premise wiring 4. Upon receipt of confirmation of channel service from the IE 2 through the LAN controller 8, the television receiver 5 is directed by the microcontroller 7 to tune to the appropriate frequency at which the requested channel service is provided by the IE 2, and the channel display 15 is updated. In the preferred embodiment of the invention, all sub-elements would be contained in a single television set, although it is envisioned that other embodiments may be necessary to accommodate older television sets unequipped with the microcontroller 7, the LAN controller 8 and the diplexer 9 elements of the invention (see Alternative Implementation).

Detailed Description Text - DETX (8):

The IE 2, illustrated in FIG. 9, is composed of six major sub-elements: A channel service tuner 16, a microcontroller 17, a LAN controller 18, an RF modem 25, an input diplexer 26, and an output diplexer 19. Both the output diplexer 19 and the input diplexer 26 act as described earlier for the SPEE diplexer 9. The channel service tuner 16 is depicted in greater detail in FIG. 10, and implements the frequency translation of up to four television channels received at its broadband signal 9 input 20, corresponding to the signal received by the MSO, to independently assigned and tunable channel frequencies at the output 24. In the preferred embodiment of the invention, the input and output frequencies of the 4 channels of the channel service tuner 16 are controlled by the microcontroller 17 which receives channel service requests from the SPEE 3 via the LAN controller 18. In particular implementations, it may be desirable to provide a bypass of one or more bands representing a subset of the frequency band available from the MSO-provided broadband signal for the purpose of passing one or more channels without having to pass through the channel service tuner. For this purpose, the basic IE architecture is readily adapted with the addition of an optional bypass filter 21 and two optional RF splitter/combiners, 22 and 23. In instances where it is desirable to have switched control over the bypass filter, switched control is feasible under command of the microcontroller 17. For the purposes of **remote** programming and control of subscriber service parameters (such as viewable channels, level of service, and for PPV programming) by the MSO, it is desirable to incorporate into the IE 2 a bi-directional communications capability to the MSO service center A (FIG. 1) through the head end equipment B (FIG. 1). This capability is embodied in the invention in the form of an RF modem 25 and an RF diplexer 26. Incorporation of these features into the IE 2 allows the MSO to control the television programming available to the subscriber, based upon his or her contracted service level, without making an on-site service call.

Detailed Description Text - DETX (14):
1. The user has **selected channel** service for the video signal centered at F.sub.SEL as depicted in FIG. 11A.

Detailed Description Text - DETX (16):
3. There is an intermediate frequency (IF), F.sub.IF whereby the **selected channel** will be isolated from adjacent channels in the frequency translation process.

Claims Text - CLTX (1):
1. An on-demand program access system for broadband, frequency division multiplexed **cable television** signals comprising: an infrastructure element (IE) constituting a local video network signal server, said IE including input and output diplexers connected to said **cable,** a channel service tuner, means connecting said channel service tuner between said input and output diplexers, respectively, a RF modem connected to said input diplexer, a microcontroller connected to said RF modem, and a LAN controller connected to said microcontroller, said microcontroller controlling said channel service tuner, and a plurality of subscriber premise equipment elements (SPEE), each SPEE constituting a video network client, coaxial premise wiring connecting each SPEE with said IE for conducting RF modulated programming signals and bi-directional data signals between said IE and each respective SPEE using out-of-band signaling so that there is no overlap between said programming signals and said bi-directional data signals.

Claims Text - CLTX (2):
2. An on-demand program access system for broadband, frequency division multiplexed **cable television** programming signals comprising: an infrastructure element constituting a local video network service, said infrastructure element comprised of a channel service tuner, a microcontroller, a LAN controller, an RF modem, and input diplexer and an output diplexer, said input diplexer and said output diplexer being connected to said channel service tuner, said input RF diplexer being connected for bi-directional control signals to said RF modem, said channel service tuner implementing frequency translation of up to four **television** channels, the input and output frequencies of the four channels of the channel service tuner being controlled by said microcontroller which receives channel service requests from a subscriber premise equipment element (SPEE), through said LAN controller, a plurality of subscriber premise equipment elements (SPEE), coaxial premise wiring means connecting each SPEE with said output diplexer for conducting RF modulated program signals and bi-directional data signals between the IE and each respective SPEE using out-of-band signaling so that there is no overlap between said programming signals and said bi-directional data signals.

Claims Text - CLTX (3):
3. The on-demand program access system for broadband frequency division multiplexed **cable television** programming signals as defined in claim 2 including first and second RF splitter combiners connected on the upstream and downstream ends of said channel service tuner, respectively, and a bypass

filter connecting between said two RF splitter/combiners and controlled by said microcontroller.

Claims Text - CLTX (5):

5. An on-demand program access system for broadband, frequency division multiplexed **cable television** programming signals comprising: an infrastructure element constituting a local video network service, said infrastructure element comprised of a channel service tuner, a microcontroller, a LAN controller, an RF modem, and input diplexer and an output diplexer, said input diplexer and said output diplexer being connected to said channel service tuner, said input RF diplexer being connected for bi-directional control signals to said RF modem, said channel service tuner implementing frequency translation of up to four **television** channels, the input and output frequencies of the four channels of the channel service tuner being controlled by said microcontroller which receives channel service requests from a subscriber premise equipment element (SPEE), through said LAN controller, first and second RF splitter combiners connected on the upstream and downstream ends of said channel service tuner, respectively, and a bypass filter connected between said two RF splitter/combiners and controlled by said microcontroller, a plurality of subscriber premise equipment elements (SPEE), coaxial premise wiring means connecting each SPEE with said output diplexer for conducting RF modulated program signals and bi-directional data signals between the IE and each respective SPEE using out-of-band signaling so that there is no overlap between said programming signals and said bi-directional data signals.

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(54) DIGITAL TELEVISION RECEIVER WITH REMOTE TUNER FOR DRIVING TRANSMISSION LINE WITH INTERMEDIATE-FREQUENCY SIGNAL

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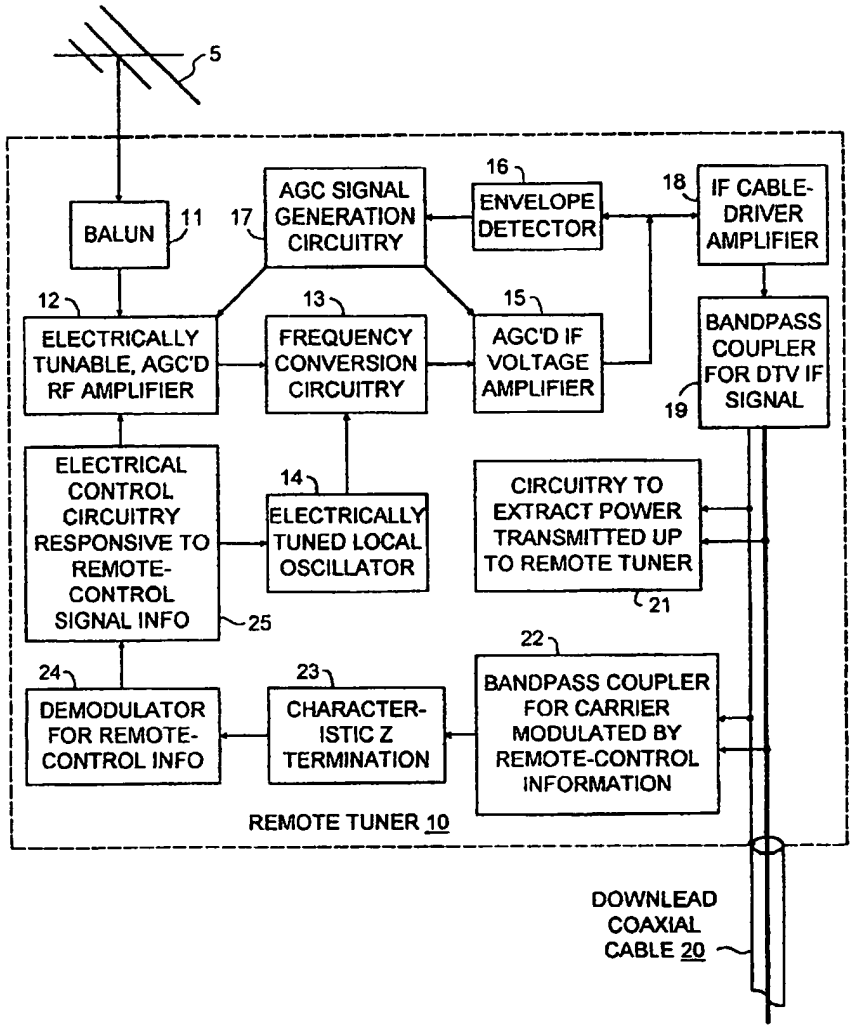
(57) ABSTRACT

An outdoor-antenna digital television receiver system has an electrically controlled remote tuner located close to the antenna. In response to a remote control signal, the remote tuner selects a particular radio-frequency digital television signal to be received, converts that RF DTV signal to an intermediate-frequency digital television signal of prescribed carrier frequency, and drives a downlead transmission line, preferably a coaxial cable. Indoors, the downlead transmission line is provided with an echo-free termination This echo-free termination may be in a "set-top" box that includes a frequency up-conveter that converts the IF DTV signal back to an RF DTV signal for reception by a conventional digital television receiver. Alternatively, the echo-free termination may be in a special DTV receiver without a local tuner. In such a special DTV receiver the IF DTV signal developed across the echo-free termination is supplied to circuitry for demodulation and analog-to-digital conversion, which circuitry supplies digitized baseband DTV signal.



DOCUMENT-IDENTIFIER: US 20030007103 A1

TITLE: Digital television receiver with **remote tuner** for driving transmission line with intermediate-frequency signal

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Abstract Paragraph - ABTX (1):

An outdoor-antenna digital television receiver system has an electrically controlled **remote tuner** located close to the antenna. In response to a remote control signal, the **remote tuner** selects a particular radio-frequency digital television signal to be received, converts that RF DTV signal to an intermediate-frequency digital television signal of prescribed carrier frequency, and drives a downlead transmission line, preferably a coaxial **cable**. Indoors, the downlead transmission line is provided with an echo-free termination This echo-free termination may be in a "set-top" box that includes a frequency up-conveter that converts the IF DTV signal back to an RF DTV signal for reception by a conventional digital television receiver. Alternatively, the echo-free termination may be in a special DTV receiver without a local tuner. In such a special DTV receiver the IF DTV signal developed across the echo-free termination is supplied to circuitry for demodulation and analog-to-digital conversion, which circuitry supplies digitized baseband DTV signal.

Application Filing Date - APD (1):

**20010109**

Title - TTL (1):

Digital television receiver with **remote tuner** for driving transmission line with intermediate-frequency signal

Summary of Invention Paragraph - BSTX (8):

[0007] The inventor points out that thinking about television system design is influenced by TV receiver design of the distant past. Originally, rather sizable electro-mechanical devices were used for channel selection, which devices were operated manually by the human viewing and listening to the TV receiver. These devices are not well suited for inclusion within a **remote tuner** that is located nearby an outdoor antenna or incorporated into the structure of the antenna. When remote-control devices for tuning TV receivers became commonplace, electrically controlled tuning displaced electromechanical devices for channel selection. In recent years monolithic integrated circuitry and surface-acoustic-wave (SAW) filters have virtually eliminated the need for servicing the low-power electronics portions of TV receivers; there is no longer need for replacing vacuum tubes or re-tuning tuned circuitry that has drifted from correct tuning. The monolithic integrated circuitry and SAW filters have reduced the size of the front-end section of a TV receiver, up to

and including the intermediate-frequency (IF) amplifier.

Summary of Invention Paragraph - BSTX (9):
[0008] The inventor points out that the improvement in reliability and reduction in size of this front-end section of the TV receiver makes feasible a **remote tuner** located nearby an outdoor antenna or incorporated into the structure of the antennas This **remote tuner** is designed to drive a coaxial-cable downlead with intermediate-frequency (IF) signal. In order to eliminate reflections of the IF signal, the coaxial cable is terminated with its characteristic impedance in the IF signal frequency range. Since any TV channel the **remote tuner** selects for reception is converted to repose in the same 6 MHz wide ff channel, the input coupling network required to terminate the coaxial cable in its characteristic impedance is the same, no matter which TV channel is selected for reception. This eliminates need for re-tuning, the input coupling network in order to terminate the coaxial cable in its characteristic impedance when different DTV broadcast channels are selected for reception.

Summary of Invention Paragraph - BSTX (10):
[0009] Preferably, reflex methods are employed to carry up operating power and remote-control signals to the **remote tuner** via the coaxial-cable downlead. Alternatively, operating power can be conducted to the **remote tuner** via separate connection. The remote-control signals for the **remote tuner** can be conducted to it via separate connection. Modulation of a carrier with the remotecontrol signals facilitates the remote-control signals being, conducted to the **remote tuner** via the coaxial-cable downlead by frequency multiplexing.

Summary of Invention Paragraph - BSTX (11):
[0010] The **remote tuner** is more easily designed to avoid being overloaded by strong signals than a wide-band RF amplifier is. The remote-control signals for the **remote tuner** can be used to control electric tuning of input coupling to the RF amplifier input stage of the **remote tuner,** as well as to control output coupling of that stage to the following mixer and to control the frequency of local oscillations applied to the mixer. The selectivity of the tuned input coupling to the RF amplifier input stage will reject strong signals not selected for reception, particularly those strong signals in channels more remote from that channel selected for reception.

Summary of Invention Paragraph - BSTX (12):
[0011] The **remote tuner** is preferably designed to include an envelope detector following its final IF voltage amplifier stage. Peaks of the envelope are detected to develop an automatic gain control (AGC) signal applied to the IF voltage amplifier stages. A delayed AGC signal is developed for application to the RF amplifier input stage of the **remote tuner,** so that a strong signal selected for reception will be prevented from overloading that stage and driving it into non-linear operation.

Summary of Invention Paragraph - BSTX (14):
[0012] An outdoor-antenna digital television receiver system constructed in

accordance with the invention has an electrically controlled **remote tuner** located close to the antenna. In response to a remote control signal, the **remote tuner** selects a particular radio-frequency digital television signal to be received, converts that RF DTV signal to an intermediate-frequency digital television signal of prescribed carrier frequency, and drives a downlead transmission line, preferably a coaxial cable. Indoors, the downlead transmission line is provided with an echo-free termination for the frequency range in which the IF DTV signal reposes. This echo-free termination may be in a "set-top" box which includes a frequency uponverter that converts the IF DTV signal back to an RF DTV signal for reception by a conventional digital television receiver. Alternatively, the echo-free termination may be in a special DTV receiver without a local tuner. In such a special DTV receiver the IF DTV signal developed across the echo-free termination is supplied to circuitry for demodulation and analog-to-digital conversion, which circuitry supplies digitized baseband DTV signal.

Brief Description of Drawings Paragraph - DRTX (2):

[0013] FIG. 1 is a schematic diagram of a **remote tuner** constructed in accordance with the invention, located near an outdoor antenna connecting thereto, and connected to a coaxial-cable downlead that the tuner drives with an intermediate-frequency DTV signal downconveted from a radio-frequency DTV signal selected for reception.

Brief Description of Drawings Paragraph - DRTX (3):

[0014] FIG. 2 is a schematic diagram of a special digital television receiver constructed without a local tuner and designed in accordance with the invention to receive and further process intermediate-frequency DTV signal supplied via the coaxial-cable downlead driven from the FIG. 1 **remote tuner**.

Brief Description of Drawings Paragraph - DRTX (5):

[0016] FIG. 4 is a schematic diagram of a **remote tuner** constructed in accordance with the invention for connection to a nearby outdoor antenna, and connected to a coaxial-cable downlead that the tuner drives with intermediate-frequency DTV signals downconverted from respective radio-frequency DTV signals selected for simultaneously being received.

Brief Description of Drawings Paragraph - DRTX (7):

[0018] FIG. 6 is a schematic diagram of a **remote tuner** connected to a coaxial-cable downlead that the tuner drives with intermediate-frequency DTV signals downconverted from respective radio-frequency DTV signals selected for simultaneously being received, the **remote tuner** shown in FIG. 6 being constructed in accordance with the invention but somewhat differently than the **remote tuner** shown in FIG. 4.

Brief Description of Drawings Paragraph - DRTX

(8):
[0019] FIG. 7 is an assembly drawing showing the arrangement of FIGS. 7A, 7B and 7C to form a complete schematic diagram of a special digital television receiver constructed without a local tuner and designed in accordance with the invention to receive intermediate-frequency DTV signals simultaneously supplied via the coaxial-cable downlead driven from the FIG. 6 **remote tuner** and to process those IF DTV signals for supporting a picture-in-picture display.

Detail Description Paragraph - DETX (2):
[0020] FIG. 1 shows an outdoor antenna 5 connected to a nearby tuner 10 constructed in accordance with the invention for being located remotely from the rest of the digital television receiver, which is located indoors. The antenna 5 connects via a balun 11 to a radio-frequency amplifier stage 12 in the **remote tuner** 10 and supplies that RF amplifier stage 12 with radio-frequency signal. The amplified radio-frequency signal from the RF amplifier stage 12 is converted to an intermediate-frequency signal by frequency-conversion circuitry 13 in the tuner 10, which frequency-conversion circuitry 13 includes an electrically tunable local oscillator 14 for selecting the DTV channel to be converted to the intermediate-frequency signal. In actual practice, the electrically tunable local oscillator 14 is likely in fact to comprise one of the types of circuitry commonly referred to as a "frequency synthesizer", which types of circuitry are already employed in TV receivers.

Detail Description Paragraph - DETX (5):
[0023] The circuitry in the **remote tuner** 10 comprising the RF voltage amplifier 12, the frequency-conversion circuitry 13, the electrically tunable local oscillator 14, the IF voltage amplifier 15, the envelope detector 16 and the AGC signal generation circuitry 17 is substantially the same as found in one or other prior-art DTV receiver design. The **remote tuner** 10 departs from conventional design in that the amplified IF signal from the IF voltage amplifier 15 is not immediately applied to nearby demodulation and analog-to-digital conversion circuitry.

Detail Description Paragraph - DETX (6):
[0024] Instead, the amplified IF signal from the IF voltage amplifier 15 is applied as input signal to an IF cable-driver amplifier 18. The cable-driver amplifier 18 is a power amplifier for the amplified IF signal, supplying it through a bandpass coupler 19 to a downlead coaxial cable 20. The source impedance of the cable-driver amplifier 18 is not larger than being comparable with the characteristic impedance of the coaxial cable 20. The source impedance of the cable-driver amplifier 18 can be designed to be the characteristic impedance of the coaxial cable 20, to reduce the possibility of secondary reflections of the amplified IF signal in the cable 20. However, the cable-driver amplifier 18 can alternatively be designed to have a source impedance lower than the characteristic impedance of the coaxial cable 20. The characteristic impedance of the coaxial cable 20 can be 51 to 125 ohms pure resistance, for example, supposing its inner conductor is straight-wire in nature. RG-59/U, which has a characteristic impedance of 75 ohms pure resistance, is commonly used as a downlead from a balun at the antenna, to

facilitate the balun proving an impedance-matched connection from a 300-ohm antenna Since the **remote tuner** 10 uses the cable-driver amplifier 18 to drive the coaxial cable 20, there is no need for the downlead to have a characteristic impedance of 75 ohms. The operating current requirements for circuitry driving signal through the cable 20 can be reduced almost twenty-fold by using a coaxial cable with an inner conductor wound as a single-layer coil. RG-65/U has a characteristic impedance of 950 ohms pure resistance. Other coaxial cable designs wind the inner conductor as a single-layer coil on a flexible magnetic core material to achieve characteristic impedances of 1600 to 2800 ohms pure resistance Insofar as cable prices permit, it is generally preferable that the coaxial cable 20 have a characteristic impedance of 950 ohms or more. A downlead with twin conductors spaced apart can be used to get higher characteristic impedance, but lack of grounded shielding makes radiation of IF signals from such downlead more of a problem than is the case with grounded-shield coaxial cable So, coaxial-cable downlead is preferred as a downlead transmission line.

Detail Description Paragraph - DETX (7):

[0025] The bandpass coupler 19 is a wideband filter, which can be constructed using inductors and capacitors, but can be more compactly constructed using ceramic resonator elements. The bandpass coupler 19 is transparent to the IF signal supplied from the cable-driver amplifier 18, but presents a lugh impedance to the coaxial cable 20 at the low frequencies at which power is cabled up to the **remote tuner** 10 via the cable 20. This high impedance usually is owing to the inclusion of a blocking capacitor in the connection of the bandpass coupler 19 to the center conductor of the coaxial cable 20. The bandpass coupler 19 also presents a high impedance to the coaxial cable 20 at frequencies where the cable 20 carries other signals in frequency multiplex with the IF signal supplied from the cable-driver amplifier 18.

Detail Description Paragraph - DETX (8):

[0026] The **remote tuner** 10 includes circuitry 21 to extract power from the cable 20 for powering the tuner 10. The outside conductor of the coaxial cable 20 is grounded as part of the normal arrangements to secure protection against lightning strike, and the circuitry 21 includes a grounded smoothing capacitor across which the direct voltage for the tuner 10 power supply is maintained A choke coil in the circuitry 21 input connection from the inside conductor of the coaxial cable 20 presents a high impedance to the IF signal supplied from the cable-driver amplifier 18 and other signals in frequency multiplex with that IF signal. In embodiments of the invention in which the power transmitted up to the tuner 10 via the cable 20 is direct-current in nature, the direct-current power is conducted from the inside conductor of the coaxial cable 20 to the grounded smoothing capacitor in the circuitry 21 via the choke coil. In some embodiments of the invention the power transmitted up to the tuner 10 via the cable 20 is alternating-current in nature. The alternating-current extracted from the inside conductor of the coaxial cable 20 via the choke coil is rectified in the circuitry 21 to develop direct voltage across the grounded smoothing capacitor therein. Different embodiments of the

invention in which the circuitry 21 includes half-wave rectification circuitry, transformerless full-wave rectification circuitry, or rectification circuitry with an isolating transformer for converting low-frequency alternating-current power to direct-current power are possible, of course Supposing the transistors in the **remote tuner** 10 are operated with supply voltages of only a few volts, the use of a stepdown isolation transformer in the circuitry 21 facilitates operating power being cabled up via the coaxial cable 20 at higher voltage and lower current, so I.sup.2R losses are lowered for a long cable run Cabling up power at a frequency higher than the 60 Hertz electrical mains frequency --e.g., 400 or 1000 Hz--reduces the bulk and weight of a stepdown transformer in the circuitry 21.

Detail Description Paragraph - DETX (9):

[0027] The **remote tuner** 10 is arranged for receiving remote-control signals transmitted from an indoor location via the coaxial cable 20. The remote-control signal information modulates a carrier frequency. The modulation may, by way of example, be a multiple-tone type of modulation, as commonly used for television receiver remote control. A bandpass coupler 22 is transparent to the carrier modulated with remote-control signal information, but presents a high impedance to the coaxial cable 20 insofar as the IF signal supplied from the cable-driver amplifier 18 is concerned. The bandpass coupler 22 also presents a high impedance to the coaxial cable 20 at the frequencies at which power is transmitted up to the **remote tuner** 10. This high impedance usually is owing to the inclusion of a blocking capacitor in the connection of the bandpass coupler 22 to the center conductor of the coaxial cable 20. The bandpass coupler 22 couples the coaxial cable 20 to a characteristic-impedance termination 23 for the cable 20, so the cable 20 is provided with an echo-free termination for the carrier modulated with remote-control signal information. The cable 20 appears to the source of that modulated carrier to be an infinite-length transmission line, since there is no echo signal reflected back to that source. The characteristic-impedance termination 23 is essentially a pure resistance for the carrier modulated with remote-control signal information and will in some embodiments of the **remote tuner** 10 essentially consist of a resistor. In usual practice, the reactive components in the bandpass coupler 32 provide tuning that negates the effects of stray reactance shunting the resistance of termination 23.

Detail Description Paragraph - DETX (11):

[0029] At least certain ones of the channel-selection control signal values for application to the electrically tunable RF amplifier 12 are converted to analog signals applied to electrically selected or electrically tuned elements in the input coupling network to the RF amplifier input stage. This input coupling network provides RF selectivity that reduces the likelihood of the RF amplifier stage or frequency-conversion circuitry in the **remote tuner** 10 being overloaded by signals much larger than that of the DTV channel selected for reception. In some **remote tuners** further channel-selection control signal values for application to the electrically tunable RF amplifier 12 are converted to analog signals applied to electrically selected or electrically tuned elements in an output coupling network from the RF amplifier input stage

to the mixer which follows the RF amplifier 12. In some inexpensive **remote tuners** the electrically tunable RF amplifier 12 is replaced by a non-tunable wideband RF amplifier or by a plurality of non-tunable sideband RF amplifiers.

Detail Description Paragraph - DETX (12):

[0030] The channel-selection control signal values for application to the electrically tuned local oscillator 14 control frequency scaling in an electrically tuned local oscillator 14 of frequency synthesizer type In some embodiments of the invention, the demodulator 24 also supplies the electrical control circuitry 25 with automatic-fine-tuning (AFT) signals in the form of a tone with analog amplitude modulation. The analog amplitude modulation of this tone is detected to recover AFT signal for application to the electrically tuned local oscillator 14, in addition to channel-selection control signal. The AFT signals originate from AFT circuitry in the indoor portion of the DTV receiver system, which AFT circuitry responds to the IF signal transmitted to it from the **remote tuner** 10 via the coaxial cable 20. In other embodiments of the invention, the **remote tuner** 10 will include its own AFT circuitry demodulation circuitry responding to IF output signal from the IF voltage amplifier 15.

Detail Description Paragraph - DETX (13):

[0031] One skilled in the art of TV receiver design knows that over-the-air terrestrial television broadcasting is done in the United States of America using 6-MHz-wide channels located in three discrete frequency ranges, as noted supra in the BACKGROUND OF INVENTION. The **remote tuner** 10 shown in FIG. 1 employs a single RF amplifier 12. Such a configuration is suitable for use in an area where only VHF signals are received, supposing the single RF amplifier 12 is specifically designed for VHF reception. Such a configuration is suitable for use in an area where only UHF signals are received, supposing the single RF amplifier 12 is specifically designed for UHF reception. In areas where both VHF and UHF signals are to be received, the **remote tuner** is likely to be modified so the font end circuitry for VF reception and the front end circuitry for UHF reception are at least to some extent separate from each other, in line with DTV receiver design practice customary up to this time Such modifications can be made without departing from the general precepts of the invention, as specifically embodied in the **remote tuner** 10 of FIG. 1.

Detail Description Paragraph - DETX (14):

[0032] FIG. 2 shows a local DTV receiver 30 that the **remote tuner** 10 can be connected to via the coaxial cable 20. The local DTV receiver 30 contains a power supply 31 for itself and the **remote tuner** 10, which power supply 31 is equipped with a power cord 32 through which it receives power from the alternating-current mains. The power supply 31 supplies a filter 33 with power to be transmitted to the **remote tuner** 10 via the coaxial cable 20. The filter 33 includes a choke coil for passing direct-current or low-frequency alternating current from the power supply 31 to the center conductor of the coaxial cable 20 through which the current passes to power the remote turner 10. The choke coil in the filter 33 presents a high impedance to the center conductor of the coaxial cable 20 insofar as the IF signal supplied from the

cable-driver amplifier 18 is concerned. The choke coil in the filter 33 also presents a high impedance to the center conductor of the coaxial cable 20 at frequencies where the cable 20 carries other signals in frequency multiplex with the IF signal supplied from the cable-driver amplifier 18. Each of the bandpass couplers 19, 22, 36, 38 usually includes a blocking capacitor in its connection to the center conductor of the coaxial cable 20, which blocking capacitor prevents flow of direct-current or low-frequency alternating current from the power supply 31 into the bandpass coupler.

Detail Description Paragraph - DETX (15):

[0033] The power supply 31 includes a power transformer with a primary winding to which the power cord 32 is connected and with a secondary winding for supplying alternating current transformed in voltage for rectification to generate direct-current power for the local DTV receiver 30. If the **remote tuner** 10 is designed to have direct-current power transmitted to it from the local DTV receiver 30, some of the direct-current power obtained through rectification is passed through the filter 33 to the center conductor of the coaxial cable 20. If the **remote tuner** 10 is designed to have alternating-current power transmitted to it from the local DTV receiver 30, the power transformer is provided with a tertiary winding grounded at one end and connected at the other end through the filter 33 to the center conductor of the coaxial cable 20.

Detail Description Paragraph - DETX (16):

[0034] The FIG. 2 local DTV receiver 30 includes circuitry 34 for generating a remote-control information signal applied to a modulator 35, which modulates a carrier in accordance with that signal to furnish a modulated carrier signal applied via a bandpass coupler 36 to the coaxial cable 20. The bandpass coupler 36 is a wideband filter, which can be constructed using inductors and capacitors, but can be more compactly constructed using ceramic resonator elements. The bandpass coupler 36 is transparent to the carrier signal modulated by the remote-control information signal, but presents a high impedance to the coaxial cable 20 at the low frequencies at which power is cabled up to the **remote tuner** 10 via the cable 20. This high impedance usually is owing to the inclusion of a blocking capacitor in the connection of the bandpass coupler 36 to the center conductor of the coaxial cable 20. The bandpass coupler 36 also presents high impedance to the coaxial cable 20 insofar as the IF signal supplied from the cable-driver amplifier 18 is concerned.

Detail Description Paragraph - DETX (17):

[0035] In the FIG. 2 local DTV receiver 30 the IF signal that the cable-driver amplifier 18 in the FIG. 1 **remote tuner** 10 applies to the coaxial cable 20 couples through a bandpass coupler 38 to a characteristic-impedance termination 39 for the cable 20. The cable 20 appears to the cable-driver amplifier 18 to be an infinite-length transmission line, since the characteristic-impedance termination 39 does not reflect the IF signal back to the amplifier 18. The characteristic-impedance termination 39 is essentially a pure resistance at IF and will in some embodiments of the local DTV receiver 30

essentially consist of a resistor In usual practice, the reactive components in the bandpass coupler 38 provide tuning that negates the effects of stray reactance shunting the resistance of termination 39. The bandpass coupler 38 presents a high impedance to the coaxial cable 20 at the low frequencies at which power is cabled up to the **remote tuner** 10 via the cable 20. This high impedance usually is owing to the inclusion of a blocking capacitor in the connection of the bandpass coupler 38 to the center conductor of the coaxial cable 20. The bandpass coupler 19 also presents high impedance to the coaxial cable 20 insofar as the remote-control information signal supplied from the modulator 35 is concerned.

Detail Description Paragraph - DETX (22):

[0040] FIG. 3 shows a local converter 50 that will up-convert IF signal received from the **remote tuner** 10 via the coaxial cable 20, to generate RF DTV signals for application to a conventional DTV receiver. The local converter 50 is the type of apparatus sometimes referred to as a "set-top box".

Detail Description Paragraph - DETX (23):

[0041] The local converter 50 includes a power supply 51 for itself and the **remote tuner** 10, a power cord 52 for conducting primary power from the alternating current mains to its power supply 51, and a filter 53 for applying power from the power supply 51 to the center conductor of the coaxial cable 20 for transmission to the **remote tuner** 10. The power supply 51 and the filter 53 are similar in design to power supply 51 and the filter 53 in the FIG. 2 local DTV receiver 30.

Detail Description Paragraph - DETX (24):

[0042] The local converter 50 includes circuitry 54 for generating a remote-control information signal applied to a modulator 55, which modulates a carrier in accordance with that signal to furnish a modulated carrier signal applied via a bandpass coupler 56 to the coaxial cable 20. The modulator 55 and the bandpass coupler 56 are similar in design to the modulator 35 and the bandpass coupler 36 in the FIG. 2 local DTV receiver 30. The circuitry 54 for generating a remote-control information signal applied to the modulator 55 includes component circuitry essentially the same as the circuitry 34 in the FIG. 2 local DTV receiver 30 used for generating a remote-control information signal applied to the modulator 35. However, the circuitry 54 further includes additional component circuitry for generating channel-selection control signal values for application to an electrically controlled local oscillator 57 used in uconverting to TV broadcast frequencies the IF signal supplied to the local converter 50 from the **remote tuner** 10 via the coaxial cable 20.

Detail Description Paragraph - DETX (25):

[0043] In the FIG. 3 local converter 50 the IF signal that the cable-driver amplifier 18 in the FIG. 1 **remote tuner** 10 applies to the coaxial cable 20 couples through a bandpass coupler 58 to a characteristic-impedance termination 59 for the cable 20. The cable 20 appears to the cable-driver amplifier 18 to be an infinite-length transmission line, since the characteristic-impedance termination 59 does not reflect the IF signal back to the amplifier 18. The

characteristic-impedance termination 59 is essentially a pure resistance at IF and will in some embodiments of the local converter 50 essentially consist of a resistor. In usual practice, the reactive components in the bandpass coupler 58 provide tuning that negates the effects of stray reactance shunting the resistance of termination 59. The IF signal appearing at the echo-free termination 59 is amplified by an automatically-gain-controlled intermediate-frequency amplifier 60 before being applied to an up-conversion, mixer 61 for heterodyning with oscillations from the electrically controlled local oscillator 57. The radio-frequency signal supplied from the mixer 61 as a result of the heterodyning is input signal for a radio-frequency buffer amplifier 62, which supplies the RF signal at low source impedance--e.g., 75 ohms--for application to the RF input connection of a conventional DTV receiver.

Detail Description Paragraph - DETX (27):

[0045] The FIG. 3 local converter 50 may be designed so that the frequency of oscillations from the controlled local oscillator 57 can be programmed to cause the RF signal supplied from the RF buffer amplifier 62 to differ in frequency from the RF signal received at the outdoor antenna 5 of the FIG. 1 **remote tuner** 10. This design reduces the chance of strong DTV signals received by the DTV receiver directly via over-the-air transmission appearing as pre-echoes of the DTV signals received by the DTV receiver from the local converter 50

Detail Description Paragraph - DETX (28):

[0046] FIG. 4 shows a **remote tuner** 70 capable of concurrently receiving I)TV signals transmitted over two different broadcast channels. Signal-splitter and balun circuitry split the response of an outdoor antenna into respective unbalanced radio-frequency input signals for electrically tunable front-end circuitry 72 and for electrically tunable front-end circuitry 73. The front-end circuitry 72 is similar to the front-end circuitry in the **remote tuner** 10 and supplies a first IF signal to the cable-driver amplifier 18. As shown in FIG. 1, this front-end circuitry comprises the electrically tunable RF amplifier 12, the frequency conversion circuitry 13, the electrically tuned local oscillator 14, the AGC'd IF voltage amplifier 15, the envelope detector 16 and the AGC signal generation circuitry 17. The amplified IF signal from the front-end circuitry 72 in the FIG. 4 **remote tuner** 70 has a first center frequency and is applied as input signal to the IF cable-driver amplifier 18. The cable-driver amplifier 18 amplifies the power of this IF signal in the FIG. 4 **remote tuner** 70, supplying it through the bandpass coupler 19 to the download coaxial cable 20.

Detail Description Paragraph - DETX (29):

[0047] The front-end circuitry 73 differs from the front-end circuitry 72 in that its frequency conversion circuitry causes an amplified second IF signal supplied from the front-end circuitry 73 to have a second center frequency differing from the first center frequency of the amplified first IF signal supplied from the front-end circuitry 72. The amplified IF signal from the front-end circuitry 73 is applied as input signal to an IF cable-driver

amplifier 74, which amplifies the power of this IF signal as subsequently supplied through a bandpass coupler 75 to the downlead coaxial cable 20. The source impedance of the cable-driver amplifier 74 is not larger being than comparable with the characteristic impedance of the coaxial cable 20. The source impedance of the cable-driver amplifier 74 can be designed to be the characteristic impedance of the coaxial cable 20, to reduce the possibility of secondary reflections of the amplified IF signal in the cable 20. However, the cable-driver amplifier 74 can alternatively be designed to have source impedance lower than the characteristic impedance of the coaxial cable 20. The bandpass coupler 75 is a wideband filter that is transparent to the second IF signal supplied from the cable-driver amplifier 74, but presents high impedance at the low frequencies at which power is cabled up to the **remote tuner** 10 via the cable 20. The bandpass coupler 75 also presents high impedance to the coaxial cable 20 at intermediate frequencies in the first IF signal supplied from the cable-driver amplifier 18.

Detail Description Paragraph - DETX (30):

[0048] The **remote tuner** 70 of FIG. 4, like the **remote tuner** 10 of FIG. 1, includes circuitry 21 to extract the from the coaxial cable 20 direct-current or low-frequency alternating current power transmitted from an indoor location. The **remote tuner** 70 of FIG. 4 is also arranged like the **remote tuner** 10 of FIG. 1 insofar as receiving remote-control signals transmitted from the indoor location via the coaxial cable 20 is concerned. The bandpass coupler 22 is transparent to the carrier modulated with remote-control signal information, coupling it to the echo-free termination 23 for application as input signal to the demodulator 24 The demodulator 24 demodulates the carrier and supplies the demodulated remote-control signal information to electrical control circuitry 76. The electrical control circuitry 76 of FIG. 4 converts some of the demodulated remote-control signal information to control signals for the electrically tunable RF amplifier and for the electrically tuned local oscillator in the front-end circuitry 72, similarly to the way that this is done by the electrical control circuitry 25 in the **remote tuner** 10 of FIG. 1. However, the electrical control circuitry 76 of FIG. 4 additionally converts further demodulated remote-control signal information to control signals for the electrically tunable RF amplifier and for the electrically tuned local oscillator in the front-end circuitry 73.

Detail Description Paragraph - DETX (31):

[0049] FIGS. 5A, 5B and 5C combine as shown in the FIG. 5 assembly figure to provide a schematic diagram of a local DTV receiver 80 designed for providing picture-in-picture (PIP) displays when receiving two DTV signals relayed from the **remote tuner** 70 of FIG. 4. FIG. 5A shows that, like the local DTV receiver 30 of FIG. 2, the local DTV receiver 80 includes the power supply 31 for itself and the **remote tuner** 70, the power cord 32 for conducting primary power from the alternating current mains to its power supply 31, and the filter 33 for applying power from the power supply 31 to the center conductor of the coaxial cable 20 for transmission to the **remote tuner** 70.

Detail Description Paragraph - DETX (32):

[0050] FIG. 5A shows that, like the local DTV receiver 30 of FIG. 2, the local DTV receiver 80 includes the modulator 35, which modulates a carrier in accordance with a remote-control information signal to furnish a modulated carrier signal applied via the bandpass coupler 36 to the coaxial cable 20. The circuitry 84 for generating a remote-control information signal applied to the modulator 35 includes components essentially the same as the circuitry 34 in the FIG. 2 local DTV receiver 30, which components are used for generating a remote-control information signal applied to the modulator 35 to be relayed via the coaxial cable 20 to the front-end circuitry 72 in the **remote tuner** 70. However, the circuitry 84 further includes additional components for generating remote-control information signal applied to the modulator 35 to be relayed via the coaxial cable 20 to the front-end circuitry 73 in the **remote tuner** 70.

Detail Description Paragraph - DETX (37):

[0055] FIG. 5A shows a bandpass coupler 98 included in the local DTV receiver 80 for coupling the second IF signal with the second center frequency from the coaxial cable to a characteristic-impedance termination 99 for the cable 20 The cable 20 appears to the cable-driver amplifier 74 to be an infinite-length transmission line, since the characteristic-impedance termination 99 does not reflect the IF signal back to the amplifier 74 in the FIG. 4 **remote tuner** 70. The characteristic-impedance termination 99 is essentially a pure resistance at the second IF signal frequencies and will in some embodiments of the local DTV receiver 80 essentially consist of a resistor. In usual practice the reactive components in the bandpass coupler 98 provide tuning that negates the effects of stray reactance shunting the resistance of termination 99. The IF signal appearing at the echo-free termination 99 is amplified by an intermediate-frequency amplifier 100 before being applied to demodulation and analog-to-digital circuitry 101 as its input signal. Circuitry 102 responds to overflow bits from the analog-to-digital conversion process to develop the AGC signal that regulates the voltage gain of the IF amplifier 100 so that the dynamic range of the analog-to-digital conversion process in circuitry 101 is well utilized. Second receiver synchronization circuitry 103 responds to the baseband DTV signal supplied from the demodulation and ADC circuitry 101 to perform receiver synchronization functions similarly to first receiver synchronization circuitry 43. Adaptive filtering 104, similar in construction and operation to the adaptive filtering 44, responds to the digitized baseband DTV signal supplied from the demodulation and ADC circuitry 101 and performs channel-equalization and echo-suppression. The resulting equalized digitized baseband DTV signal is applied as input signal to a trellis decoder 105 that performs the symbol decoding function. The trellis decoder 105 is the customary 12-phase type, presuming 8-VSB DTV signal is to be received. The symbol decoding results are, per customary practice, fed back from the trellis decoder 105 to the adaptive filtering 104, to furnish a basis from which to obtain estimates as to the symbols actually transmitted by the transmitter. These estimate are usefull in decision-feedback algorithms for adapting the parameters of the adaptive filtering 104 and are useful in iterative filtering procedures that the adaptive filtering 104 may employ to suppress post-echoes.

Detail Description Paragraph - DETX (45):

[0063] The **remote tuner** 70 of FIG. 4 and its companion local DTV receiver 80 provide for the simultaneous reception of two DTV channels and the insertion of the picture received over either of the channels into the picture received over the other of the channels. **Remote tuners** that provide for the simultaneous reception of an even larger number of DTV channels can be constructed in accordance with the precepts of the invention here described Companion local DTV receivers for such **remote tuners** can also be constructed in accordance with the precepts of the invention here described. Such a local DTV receiver selects one of the simultaneously received DTV signals to supply sound and the main displayed information. The receiver has capability for selecting one or more of the others of these DTV signals for picture-in-picture display, with a wide variety of swapping features being possible. Variants of the invention which admit some of the received signals being analog television signals--e.g., of NTSC type--are easily constructed, also, by one skilled in the art of television receiver design and acquainted with the contents of this specification and its accompanying drawing.

Detail Description Paragraph - DETX (48):

[0066] A design problem in the system comprising the **remote tuner** 70 and the local DTV receiver 90 is designing the bandpass couplers so as not to affect each other. This problem becomes more difficult when a number of different intermediate-frequency signals are required and when one wishes to space these different intermediate-frequency signals not too far apart in the frequency spectrum. The system comprising the **remote tuner** of FIG. 6 and the local DTV receiver of FIGS. 7A, 7B and 7C provides a solution to this design problem

Detail Description Paragraph - DETX (49):

[0067] FIG. 6 shows a **remote tuner** 130 that is a modification of the **remote tuner** 70 shown in FIG. 4. The **remote tuner** 130 also drives the coaxial-cable downlead 20 with IF DTV signals down converted from respective RF DTV signals selected for simultaneous reception, but does not have bandpass couplers 19 and 75 for applying the plural IF signals to the coaxial cable 20. The center conductor of the coaxial cable 20 is coupled through a capacitor 131 to a characteristic-impedance termination 132 for the coaxial cable 20. This characteristic-impedance termination 132 can simply be a resistor. The cable-drive amplifiers 18 and 74 are replaced in **remote tuner** 130 by transconductance amplifiers 133 and 134, respectively, which share the characteristic-impedance termination 132 as a common load impedance. The voltage appearing across the termination 132 includes a first IF signal component responsive to a first portion of the output current of the transconductance amplifier 133 flowing in response to the first IF signal voltage from the front-end circuitry 72, a second IF signal component responsive to a first portion of the output current of the transconductance amplifier 134 flowing in response to the second IF signal voltage from the front-end circuitry 73, and a further component, which is a carrier modulated by remote-control information signal. The capacitor 131 is a blocking capacitor for d-c power or low-frequency a-c power transmitted up to the **remote tuner** 130 from the local DTV receiver located indoors. A buffer amplifier 135

applies the voltage across the characteristic-impedance termination 132 to a bandpass coupler 136 for the carrier modulated by remote-control information signal, to be coupled to the input of the demodulator 24. The buffer amplifier 135 is preferably of such design its input port presents very low shunt capacitance to the characteristic-impedance termination 132. For example, neutralization of the buffer amplifier 135 using Miller feedback is a technique for reducing the shunt capacitance its input port offers.

Detail Description Paragraph - DETX (50):

[0068] The bandpass coupler 22 and the characteristic-impedance termination 23 of the FIG. 4 **remote tuner** 70 are not included in the **remote tuner** 130. The bandpass coupler 136 provides the selectivity for the carrier modulated by remote-control information signal that the bandpass coupler 22 provides in **remote tuner** 70.

Detail Description Paragraph - DETX (51):

[0069] The circuitry 22 of the **remote tuner** 70 is shown more explicitly in the FIG. 6 **remote tuner** 130, as including a series-arm choke coil 137 and a shunt-leg bypass capacitor 138 for the IF signals and for the carrier modulated by remote-control information signal. This filter arrangement conducts the d-c power or low-frequency a-c power transmitted from the local DTV receiver to circuitry 139 for applying that power as operating power to the elements of the **remote tuner** 130, but prevents the flow of currents to the circuitry 139 responsive to the IF signals or the carrier modulated by remote-control information signal.

Detail Description Paragraph - DETX (52):

[0070] FIGS. 7A, 7B and 7C combine as shown in the FIG. 7 assembly figure to provide a schematic diagram of a local DTV receiver 140 designed for providing picture-in-picture (PIP) displays when receiving two DTV signals relayed from the **remote tuner** 130 of FIG. 6. The local DTV receiver 140 is a modification of the local DTV receiver 90 of FIGS. 5A 5B and 5C.

Detail Description Paragraph - DETX (54):

[0072] The filter 33 of the local DTV receiver 140 is shown more explicitly in the FIG. 7A, as including a series-arm choke coil 141 and a shunt-leg capacitor 142 for the IF signals and for the carrier modulated by remote-control information signal. This series-arm choke coil 141 conducts de power or low-frequency a-c power from the power supply 33 to the coaxial cable 20 for transmission up to the **remote tuner** 130. The capacitor bypasses the power supply 33 insofar as an IF signal or the carrier modulated by remote-control information signal is concerned.

Detail Description Paragraph - DETX (55):

[0073] The portion of the local DTV receiver 140 shown in FIG. 7A differs in the following respects from the portion of the local DTV receiver 90 shown in FIG. 5A. The bandpass couplers 36, 38 and 98 are omitted in the local DTV receiver 140. So are the characteristic-impedance terminations 39 and 99. The center conductor of the coaxial cable 20 is coupled through a capacitor 143 to

a characteristic-impedance termination 144 for the cable 20. The carrier modulated by remote-control information signal that is supplied from the modulator 35 is amplified by a transconductance amplifier 145 that resistively couples via the capacitor 143 and the coaxial cable 20 to the characteristic-impedance termination 132 in the FIG. 6 **remote tuner** 130 for causing a carrier modulated by remote-control information signal current to flow through that termination 132. This current is responsible for the carrier modulated by remote-control information signal component of the voltage that appears across the termination 132 and is applied by the buffer amplifier 135 to the bandpass coupler 136. It is this component of the voltage that the bandpass coupler 136 selects to the input circuit of the demodulator 24 included in the **remote tuner** 130 for demodulating the remote-control information signal.

Detail Description Paragraph - DETX (63):

[0081] Another, plural-conversion approach that can be taken is to frequency multiplex first and second IF signals that result from upconversion to the UHF band in the **remote tuner,** apply these UHF signals to the coaxial cable 20, and then in the local DTV receiver down-convert these UHF signals individually to VHF IF signals with similar carrier frequencies, or to VHF IF signals with non-overlapping frequency spectra. This approach is advantageous if several DTV channels are to be simultaneously received in that harmonics of the UHF IF signals can all far above the signals themselves in frequency. Terminating the coaxial cable 20 with its characteristic impedance for a number of contiguous 6-MHz-bandwidth IF signal channels can be easier to do, since their combined bandwidth is a smaller fraction of their absolute frequencies. Preventing radiation of the IF signals to the atmosphere can be a greater problem with UHF IF signals, however, than with IF signals of lower frequency.

Detail Description Paragraph - DETX (64):

[0082] Supposing that the local DTV receiver is of cable-ready design, still another pluralonversion approach is for the **remote tuner** to use It signals reposing in the superband cable-TV channels. Then, in the local DTV receiver the **remote tuner** IF signals can be down-conveited using the same set of converters used for developing PIP signals for reception from cable-TV signals.

Detail Description Paragraph - DETX (65):

[0083] One skilled in the art of television reception design will by acquaintance with the **remote tuner** concept taught in this specification be enabled to design a number of television reception systems employing a remote timer, which observation should be borne in mind when evaluating the scope of the claims which follow.

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(54) ESTABLISHING CONNECTIONS BETWEEN REMOTE DEVICES WITH A HYPERTEXT TRANSFER PROTOCOL

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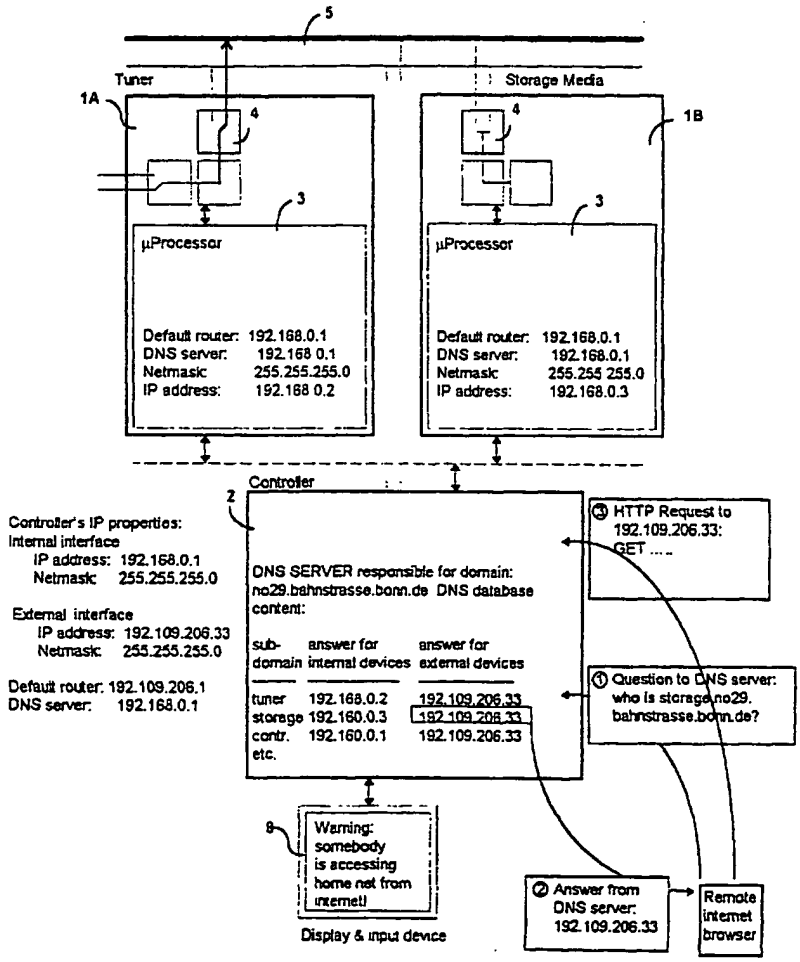
(57) ABSTRACT

A connection between remotely controllable devices (1; 1A, 1B, 1C) is established by controlling said remotely controllable devices (1; 1A, 1B, 1C) independently by use of a hypertext transfer protocol. Such a remotely controllable device (1; 1A, 1B, 1C) comprises a control interface (3) using a hypertext transfer protocol to establish said connection. A control device (2) for performing such a remote control comprises a first interface (2*a*) to control said controllable devices (1; 1A, 1B, 1C) remotely using a hypertext transfer protocol to establish said connection between at least two of said remotely controllable devices (1; 1A, 1B, 1C). A control device (2) according to the present invention is characterized by a second interface (2*b*) to control said control device (2) using a hypertext transfer protocol. With the invention directly controllable connections between remotely controllable devices can be established with a hypertext transfer protocol.



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TITLE: ESTABLISHING CONNECTIONS BETWEEN REMOTE DEVICES WITH A HYPERTEXT TRANSFER PROTOCOL

---------- KWIC ---------

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Summary of Invention Paragraph - BSTX (4):
[0003] A method for controlling a remote device with HTTP is known from the internet. Certain internet sites demonstrate how to control an audio-video-device (AV-device), such as an audio tuner or a television receiver to switch to different **channels** so as to broadcast different selectable information to and via the internet. An example of such a system is shown in FIG. 14. Here, it is shown how to control a radio with HTTP. A radio transmitter 100 as source device inputs an analog signal with multiple services to a target device, here a server 101 offering a universal resource locator, e.g. http//www.chilton.com/scripts/radio/R8-r- eceiver. The server 101 includes a micro-controller and HTTP server 103 offering the possibility to select one of the multiple services received from the radio transmitter 100 via the internet and to output it to the internet. In this case HTTP is used as transfer protocol. The micro-controller and HTTP server 103 offers a graphical user interface to any internet user selecting the universal resource locator of the server 101. An internet user needs a controller 102, like a Web Browser to establish an asynchronous connection to the server 101. This asynchronous point-to-point connection is established for audio data and for the HTTP control protocol.

Summary of Invention Paragraph - BSTX (7):
[0006] On the other hand, network environments are known that require interoperability between audio/video sources and target devices having transport mechanisms e.g. defined in IEEE 1394 that is used to enable communication between attached devices with guaranteed bandwidth. Such a network environment is shown in FIG. 13. IEEE 1394 specifies "isochronous" **channels** which offer guaranteed bandwidth between attached source and target devices. Additionally there are "asynchronous" **channels** which offer point-to-point connections for system specific control protocols. Here, various system specific protocols are specified e.g. for digital VCRs, DVB tuners, DAB tuners, etc., to enable control of the corresponding devices of various types. In FIG. 13 two of such remote devices 1 are shown. One is a tuner device type 1A and the other is a storage media device type 1B. Both devices 1 have a logical interface 4 connected to the isochronous **channels** of the IEEE 1394 network. Both devices 1 comprise a micro-processor 9 used to control these devices 1. Both devices 1 also have a logical interface 6 connected to a controller 2 via an asynchronous **channel** of the IEEE 1394

network. Such a multifunctional controller 2, i.e. a system capable of controlling all attached remote devices 1, needs to support all system specific protocols and has therefore a relatively complicated structure. Furthermore, adding an additional device type requires in general a corresponding upgrade of the controller 2, since every remote device 1 of a different type or make needs a system specific control protocol to be sent via the asynchronous **channel**.

Detail Description Paragraph - DETX (4):

[0040] The controller 2 can be accessed by a user to control each of the remote devices 1A, 1B, 1C connected thereto. Apart from the selection which isochronous **channel** is to be used by a device to broadcast data via a guaranteed bandwidth connection, which is selected by the system itself in dependence of currently available capacities, the user can fully control each of the remote devices 1A, 1B, 1C. In the shown example the user can select which of the multiple services input into the **remote tuner** device 1A, should be processed and broadcasted to an isochronous connection by controlling the switch 6. The remote storage medium device 1B is controlled by the user to select one of the connected isochronous connections, the incoming data of which should be processed and recorded on the storage medium 7.

Detail Description Paragraph - DETX (6):

[0042] In FIG. 1 the isochronous and asynchronous connections are displayed separately, but in real systems both types of connections are supported in the same **cable,** as it is the case in the IEEE 1394 system. In IEEE 1394 a method is specified to support IP on top of IEEE 1394 connections, consequently it can also support TCP and HTTP connections. It is also thinkable that a naming system such as DNS (Domain Name System) enables the assignment of domain-names to remote devices and that other protocols will be implemented to improve the plug and play behavior, e.g. for automatic assignment of IP addresses, net masks or DNS name servers. DHCP (Dynamic Host Configuration Protocol) or a similar protocol can serve to do this.

Detail Description Paragraph - DETX (8):

[0044] The IEEE 1394 bus system is currently being used to connect consumer audio/video devices. However, according to the present invention, it is possible to: [circle over (1)] Connect such remote devices to internet servers, e.g. for software upgrades. [circle over (2)] Besides using the controller 2 to control and view conventional 1394 services, the user can use the same controller 2 to select and access internet services. [circle over (3)] Connections to the internet can also be necessary for other reasons, e.g. travelling **customers** may require access to their remote home network devices through the internet.

Detail Description Paragraph - DETX (9):

[0045] Parts of the following initialization procedure have been designed to accommodate such features. In the following example, it is assumed that the controller 2 is a PC or a PC-like device that could function as a gateway to the internet as shown in FIG. 12. The connection to the internet can be supported, e.g. by a telephone modem or a **cable** modem. The following sections

describe each step of the boot procedure after a conventional network initialization has been described.

Detail Description Paragraph - DETX (60):

[0096] Its current services; e.g. in case of a tuner this refers to the broadcast signal, which it receives as its input; to describe such signals the tuner will convert MPEG data and/or associated DVB SI (Digital Video Broad-casting Service Information) data to HTML data; e.g. in case of a storage device in recording mode this refers to the input signals such as audio/video data on isochronous **channels**; besides the textual description of the services as shown in FIG. 5, preferrably also the audio video data will be presented in the HTML menu. To support moving pictures, the commands "server push" or "client pull" can be used to update the picture regurlarly;

Detail Description Paragraph - DETX (68):

[0104] With the first menu from the selected remote storage media device 1B, the user notices in this case that this device is currently connected to a camera. As the user might wish to record from the tuner instead of the camera, he requests the next service, as it is shown in FIG. 9, with uttering the word "next". In an eigth step the controller 2 recognizes this command, the Browser finds in the following step 9 the "next" anchor and sends the HTTP command "GET/storage.no29.bahnstrasse.bonn.de/next.cgi- " to the IP address 192.168.0.3 of the remote storage media device 1B. In the tenth step the HTTP server 3 of the remote storage media device 1B receives this command and executes the script "next.cgi". Therefore, the storage media device 1B selects a new isochronous **channel** and presents a new menu.

Detail Description Paragraph - DETX (69):

[0105] In FIG. 10 it is shown that in a eleventh step the controller 2 receives the updated menu from the remote storage media device 1B and presents it to the user on the display and input device 8 connected thereto. The new menu now includes the data received on the isochronous **channel** that connects the **remote tuner** device 1A with the remote storage media device 1B, in this case the picture of CNN.

Detail Description Paragraph - DETX (70):

[0106] As the user has put the remote storage media device 1B in the desired state, he can now switch to the **remote tuner** device 1A with the "tuner" command, to select a desired **channel**.

Detail Description Paragraph - DETX (72):

[0108] Again the browser will try to find an anchor, associated with the command "tuner". It will then follow the HREF field in that anchor. Consequently it will perform a DNS lookup for "tuner.no29.bahnstrasse.bonn.de" and send the HTTP command "GET/tuner.no29.bahnstrasse.bonn.de" to the appropriate IP address. The latter will return the menu associated with that path, which will include information on currently selected services. Also this menu has "next" and "back" entries, but these will perform operations that are different from the next and back operations of the storage media device 1B.

For example, the tuner's "next" operation may change the tuner's frequency while the tuner output remains on the same isochronous **channel** number.

Detail Description Paragraph - DETX (74):

[0110] To enable an easier set-up of isochronous **channels,** FIG. 11 shows the principles of an extended network initialization, the unsolicited audio video data broadcasting, that is explained in the following again using the IEEE 1394 network system.

Detail Description Paragraph - DETX (76):

[0112] To improve the user friendliness it is desireable to avoid constraining the order of controlling the remote devices. In other words, the user should have the freedom to choose which source/remote device to control first. For this purpose, according to the invention each device which is capable of sending data on isochronous **channels** can start broadcasting such data in the preferred data format soon after start up. From a technical point of view such broadcasting can be called "unsolicited" as unlike in conventional networks, no direct or indirect user command is required to initiate isochronous data transfer. These devices can also continue broadcasting after basic connections have been established. If necessary, to avoid wasting bandwidth, video data with a high degree of temporal and spatial redundancy can be used for this purpose. In case of e.g. MPEG2 transport streams, such video data can be compressed efficiently to very low bit rates. If such a signal is not available at the input of the broadcasting device, in other words, if there is no bit rate signal available which can be forwarded to the IEEE 1394 isochronous **channel,** it could be generated with hardware or software in the device. Preferrably, this initial isochronous data will also provide information for the user to help understand the type and state of the device.

Detail Description Paragraph - DETX (77):

[0113] Existing IEEE 1394 devices, i.e. legacy devices, do not support the capability to generate such a low bit rate stream internally. However, according to the invention, new devices can instruct these legacy devices to start broadcasting data, albeit at conventional bit rates, on isochronous **channels** soon after start up. In case of tuners, this effectively means forwarding **cable** or satelite bit streams to the home network. Storage media devices with tuners, e.g. VCR's, could also forward broadcasting services to avoid mechanical operations. In case where it is not desireable that legacy devices behave this way, e.g. because of bandwidth, power consumption or other limitations, the system can inform the user that these devices should be programmed first.

US005732078A

# United States Patent [19]

Arango

[11] Patent Number: 5,732,078

[45] Date of Patent: Mar. 24, 1998

[54] **ON-DEMAND GUARANTEED BANDWIDTH SERVICE FOR INTERNET ACCESS POINTS USING SUPPLEMENTAL USER-ALLOCATABLE BANDWIDTH NETWORK**

[75] Inventor: **Mauricio Arango**, Madison, N.J.

[73] Assignee: **Bell Communications Research, Inc.**, Morristown, N.J.

[21] Appl. No.: **586,416**

[22] Filed: **Jan. 16, 1996**

[51] **Int. Cl.**[6] ..... **H04L 12/46**; H04L 12/66

[52] **U.S. Cl.** ..... **370/355**; 370/395; 370/401

[58] **Field of Search** ..... 370/352, 355, 370/389, 395, 396, 400, 401, 402, 403, 404, 410, 465, 466, 468; 395/200.02, 200.12, 200.15

[56] **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 5,172,372 | 12/1992 | Konish | 370/401 |
| 5,179,555 | 1/1993 | Videlock et al. | 370/402 |
| 5,426,637 | 6/1995 | Derby et al. | 370/401 |
| 5,463,625 | 10/1995 | Yasrebi | 370/401 |
| 5,548,578 | 8/1996 | Matsune et al. | 370/401 |

OTHER PUBLICATIONS

L. Zhang et al., RSVP, A New Resource ReSerVation Protocol, IEEE Network, Sep. 1993.

D. Katz et al., NBMA Next Hop Resolution Protocol (NHRP), IETF draft-ietf-nhrp-07.txt.

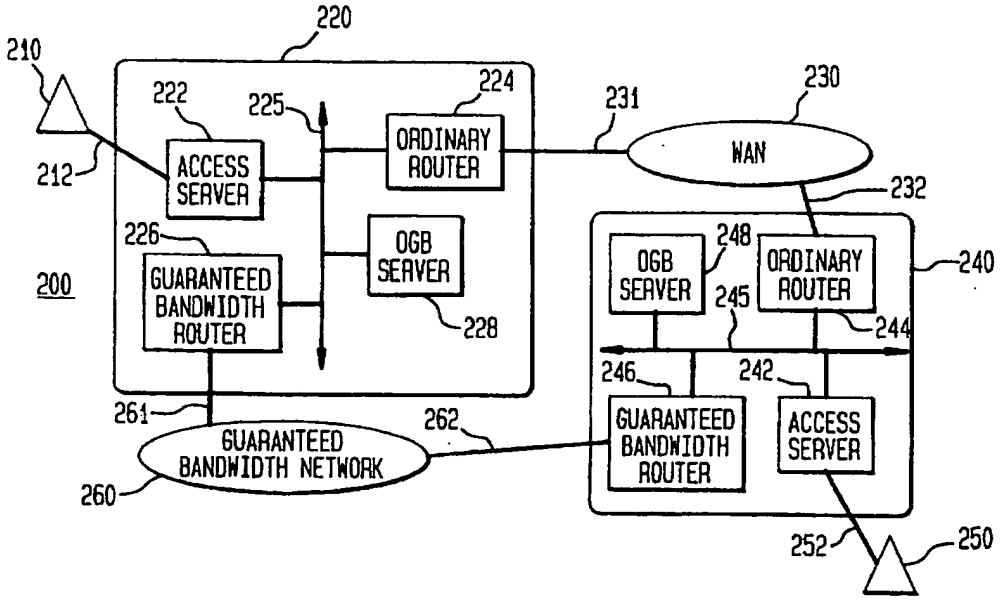
*Primary Examiner*—Alpus H. Hsu

*Attorney, Agent, or Firm*—James W. Falk; Joseph Giordano; Loria B. Yeadon

[57] **ABSTRACT**

An access point **220** is provided with an access link **212** to a first host **210**. The access point **220** has a first link **231** to a wide area network **230** which is the Internet backbone. Packets are communicated on the wide area network **230** using a best effort scheme at an uncontrollable, unpredictable and fluctuating rate. Neither the first host **210** nor the access point **220** are capable of selecting or controlling the rate at which packets are transmitted on the wide area network **230**. The access point **220** also has a second link **261** to a guaranteed bandwidth network **260**. The access point **220** is able to, on demand, establish a continuous bandwidth channel on the guaranteed bandwidth network **260** with an arbitrary other access point **240**, to which another host **250** is connected, at a particular continuous packet transfer rate. The first host **210** can generate a packet requesting that the access point **220** establish a continuous bandwidth session with a second host **250**. In response, the access point **220** transmits a packet via the first link **231** and the wide area network **230** to a second access point **240** to which the second host **250** is connected. The transmitted packet contains a request to set up a continuous bandwidth channel with the first host **210**. The access point **220**, to which the first host **210** is connected, and the second access point **240**, to which the second host **250** is connected, establish a continuous bandwidth channel via the second link **261** and guaranteed bandwidth network **260**. The access point **220**, to which the first host **210** is connected, communicates packets between the first and second hosts **210** and **250** via the second link **261**, i.e., receives packets destined to the first host **210** from, or transmits packets originating from the first host **210** to, the second link **261**.

**5 Claims, 3 Drawing Sheets**



US-PAT-NO: 5732078

DOCUMENT-IDENTIFIER: US 5732078 A

TITLE: **On-demand** guaranteed bandwidth service for internet access points using supplemental user-allocatable bandwidth network

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Application Filing Date - AD (1):
**19960116**

TITLE - TI (1):
**On-demand** guaranteed bandwidth service for internet access points using supplemental user-allocatable bandwidth network

Brief Summary Text - BSTX (6):
The WAN 110 is referred to as a "wide area" network because it sprawls across **remote** geographic locations. Each access point a,b,c, or d is typically part of a network access provider network. Each access point is localized to a particular geographic location. The subnetworks I1-I6 are typically located at a single campus of buildings and serve one enterprise. The subnetworks I1-I6 may be connected to the access points a,b,c, or d by ordinary analog telephone lines, by leased digital lines (56K, T1, T3) by an ISDN network or by a **cable television** access network.

Detailed Description Text - DETX (3):
Also shown is a guaranteed bandwidth network 260. The first access point 220 is connected to the guaranteed bandwidth network 260 via a link 261. The second access point 240 is connected to the guaranteed bandwidth network 260 via a link 262. The guaranteed bandwidth network 260 may be a switched network such as an ISDN network or an ATM network. Illustratively, the access points 220 and 240 can, on demand, set up and tear down communication channels on the guaranteed bandwidth network having a particular predefined or selected bandwidth. Once set up, the guaranteed bandwidth network 260 provides a communications **channel which is guaranteed to have the predefined or selected** bandwidth continually during the session.

Detailed Description Text - DETX (5):
The access point 220 has an access server 222, an ordinary router 224, a guaranteed bandwidth router 226 and an on-demand guaranteed bandwidth (OGB) server 228. All of these devices 222, 224, 226 and 228 are connected via a LAN 225. The access provider 222 is connected to the host 210 via an access link 212. Illustratively, the access link 212 can be an analog telephone line, an ISDN line, a leased digital line or a **cable television** network link. The router 224 is connected to the WAN 230 via the link 231. The router 226 is

connected to the guaranteed bandwidth network 260 via the link 261. Note that the devices 222, 224, 226 and 228 form an abbreviated block diagram of the access point 220. The access point 220 typically has multiple ordinary routers 224 and links 231 to the WAN 230 and may have multiple access servers 222, multiple OGB servers 228, multiple guaranteed bandwidth routers 226 and multiple links 261 to one or more guaranteed bandwidth networks 260.

Detailed Description Text - DETX (6):

Likewise, the access point 240 has an access server 242, an ordinary router 244, a guaranteed bandwidth router 246 and an OGB server 248. The devices 242, 244, 246 and 248 are connected via a LAN 245. The access server 242 is connected to the host 250 via an access link 252. Illustratively, the access link 250 can be an analog telephone line, an ISDN line, a leased digital line or a **cable television** network link. The router 244 is connected to the WAN 230 via the link 232. The router 246 is connected to the guaranteed bandwidth network 260 via the link 262. Like the access point 220, the access point 240 typically has multiple ordinary routers 244 and links 232 to the WAN 230 and may have multiple access servers 242, multiple OGB servers 248, multiple guaranteed bandwidth routers 246 and multiple links 262 to one or more guaranteed bandwidth networks 260.

Detailed Description Text - DETX (28):

FIG. 7 shows an alternative access point architecture. The network architecture 300 is shown as before with host 210 connected via an access link 212 (analog telephone line, ISDN line, leased digital line, **cable television** network link, etc.) to an access point 320. The access point 320 is connected via an access link 231 to best effort WAN 230 (which is the Internet backbone) and to a guaranteed bandwidth network 260 via link 261. Likewise, host 250 is connected via an access link 252 to access point 240. Access point 240 is connected via link 232 to the WAN 230 and via link 262 to guaranteed bandwidth network 260.

United States
Belcher et al.

3,987,397
Oct. 19, 1976

[54] REMOTE UNIT FOR A TWO-WAY CABLE COMMUNICATIONS SYSTEM

[76] Inventors: **Brian E. Belcher**, 7023 Wakefield, Dallas, Tex. 75231; **John G. Campbell**, 1109 Portales Lane, Irving, Tex. 75060

[22] Filed: **Apr. 25, 1975**

[21] Appl. No.: **571,576**

[52] **U.S. Cl.** ..... **325/308**; 325/31; 178/DIG. 13

[51] **Int. Cl.²** ..... **H04B 1/00**

[58] **Field of Search** ..... 325/31, 308, 309, 37, 325/390–394, 458, 459, 464, 465; 178/DIG. 13

[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,757,225 | 9/1973 | Ulicki | 325/308 |
| 3,768,019 | 10/1973 | Podowski | 325/391 |
| 3,794,922 | 2/1974 | Osborn et al. | 178/DIG. 13 |
| 3,803,491 | 4/1974 | Osborn | 178/DIG. 13 |
| 3,886,302 | 5/1975 | Kosco | 325/308 |

OTHER PUBLICATIONS

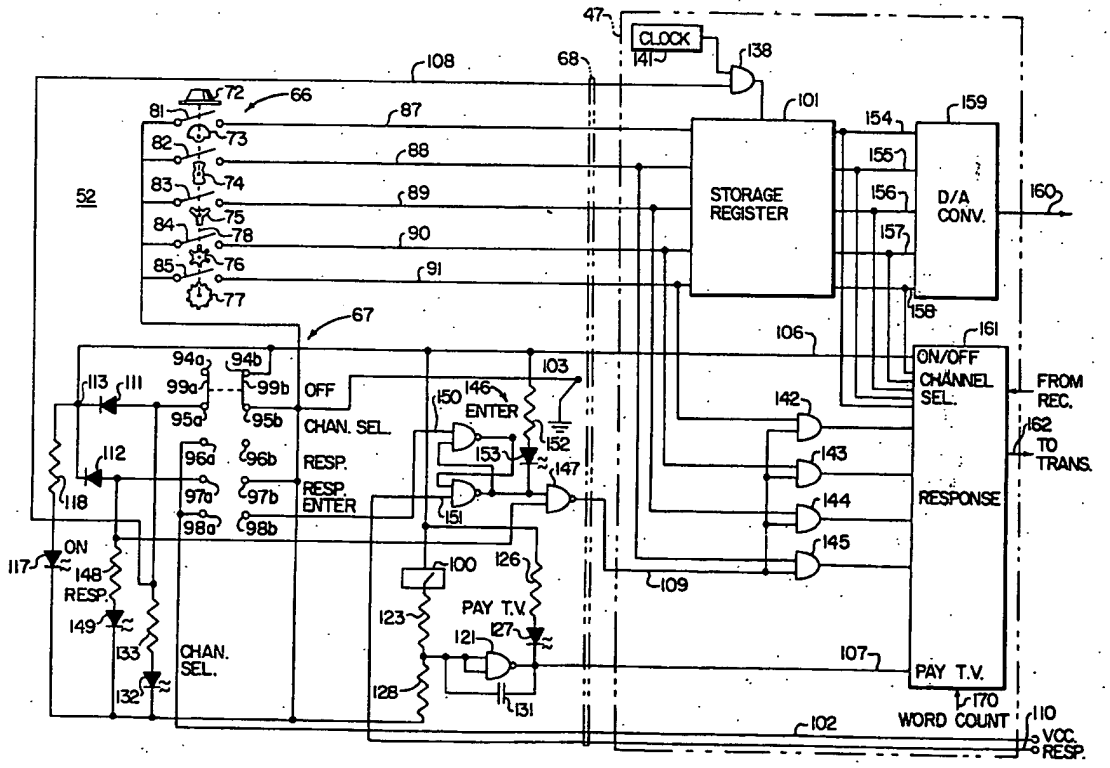
I.E.E.E. Spectrum Applications Report on "Two-Way Applications for Cable Television Systems in the '70s", by Jurgen, pp. 39–54, 11/1971.

*Primary Examiner*—Robert L. Griffin
*Assistant Examiner*—Jin F. Ng
*Attorney, Agent, or Firm*—Giles C. Clegg, Jr.

[57] **ABSTRACT**

A two-way cable communications system includes a master station having a transmitter for transmitting television program and interrogation signals to a plurality of remote units or transceivers through a cable network and a receiver for receiving reply signals from individual ones of the remote units. Each remote unit includes a receiver for receiving the program and interrogation information from the master station, a transmitter for transmitting reply signals back to the master station and television converter and receiver means for reproducing the television programs. A remote control means coupled to the remote unit through a mmulticonductor cable includes a channel selector and encoder means for encoding the channel selector information and a switch means to enable the channel selector to be utilized to provide viewer response information. The output of the encoder means is clocked into a storage register having its output coupled to a converter which operates a television tuner when the switch means is in a first condition. The output of the storage register is also coupled to a data readout circuit which is enabled by an interrogation signal to apply the data to the remote transmitter. The encoder output is also applied to a gating circuit which is enabled when the switch means is in a second condition to couple the output to the data readout circuit. Thus both program rating and viewer response information may be obtained from the remote channel selector control.

**12 Claims, 5 Drawing Figures**



US-PAT-NO: 3987397

DOCUMENT-IDENTIFIER: US 3987397 A

TITLE: Remote unit for a two-way **cable** communications system

---------- KWIC ---------

Abstract Text - ABTX (1):

A two-way **cable** communications system includes a master station having a transmitter for transmitting television program and interrogation signals to a plurality of remote units or transceivers through a **cable** network and a receiver for receiving reply signals from individual ones of the remote units. Each remote unit includes a receiver for receiving the program and interrogation information from the master station, a transmitter for transmitting reply signals back to the master station and television converter and receiver means for reproducing the television programs. A remote control means coupled to the remote unit through a mmulticonductor **cable** includes a channel selector and encoder means for encoding the channel selector information and a switch means to enable the channel selector to be utilized to provide viewer response information. The output of the encoder means is clocked into a storage register having its output coupled to a converter which operates a television tuner when the switch means is in a first condition. The output of the storage register is also coupled to a data readout circuit which is enabled by an interrogation signal to apply the data to the remote transmitter. The encoder output is also applied to a gating circuit which is enabled when the switch means is in a second condition to couple the output to the data readout circuit. Thus both program rating and viewer response information may be obtained from the remote channel selector control.

Application Filing Date - AD (1):

**19750425**

TITLE - TI (1):

Remote unit for a two-way **cable** communications system

Brief Summary Text - BSTX (9):

One popular form of remote transceiver includes a **remote tuner** control which is connected to the control box through a multiconductor cable. With this latter arrangement a problem arises when it is desired to provide program rating information to the central station in order that information as to the channel being viewed be available for transmission to the master station on command. Because of the inconsistencies between varactors, a mere determination of the varactor voltage and subsequent conversion thereof to a digital readout capable of upstream transmission in response to a command from the master station for program rating information is inaccurate.